ASSESSMENT OF ESSENTIAL DRUG MANAGEMENT IN THE PUBLIC HEALTH FACILITIES IN UGANDA

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Declaration

This thesis in its original form is entirely mine and has never been submitted to this University or any other institution of higher learning for any award. It is a product of my original work and study done in Uganda between December 2005 and February 2006.

Other sources are fully acknowledged.

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David Nahamya

Date: _____

This thesis has been submitted for examination to the University with my full permission.

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Dr. Edina Sinanovic

SUPERVISOR

Date: _____

Dedication

I dedicate this thesis to my wife Masiko and my daughters Sonia and Isabella who endured my absence from home during the period at the university to accomplish this assignment. I also dedicate it to my parents whose blessings have enabled me to achieve many goals in life. All possible in the name of Almighty God!

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Acronyms

ACT	Artemesinin-based Combination Therapy
AIDS	Acquired Immune Deficiency Syndrome
ARV	Antiretroviral
DAS	Drug Availability Study
DCMI	Drug Management for Childhood Illness
DDHS	District Director of Health Services
DIFD	U.K. Department for International Development
DMM	Drug Management for Malaria
DUS	Drug Use Study
EDLU	Essential Drug List of Uganda
FEFO	First Expiry, First Out
GFATM	Global Fund for AIDS, TB and Malaria
HC	Health Centers
HIV	Human Immunosuppressive Virus
HSD	Health Sub-District
IFPMA	International Federation of Pharmaceutical Manufacturers and association
IMCI	Integrated Management of Childhood Illness
JMS	Joint Medical Stores
MSH	Management Sciences for Health
NDA	National Drug Authority
NDP	National Drug Policy
NMHCP	National Minimum Health Care Package
NMS	National Medical Stores
PHC-CG	Primary Health Care – Conditional Grant
PMM	Pharmaceutical Management for malaria
PNFP	Public Not-For Profit
PPDA	Public Procurement and Disposal of Assets Act
R&D	Research and Development
RPM Plus	Rational Pharmaceutical Management Plus [Program]
UCG	Uganda Clinical Guidelines
UEDMP	Uganda Essential Drugs Management Programme

UNAIDS	United Nations Joint Programme on AIDS
USAID	United States Agency for International Development
WHO	World Health Organization

Abstract

A significant portion of the pharmaceutical expenditures in developing countries is wasted due to inefficiencies associated with the management of drug supplies, including drug selection, distribution and use. Essential drugs are the foundation for nearly every public health programme aimed at reducing morbidity and mortality in the developing world, and the pharmaceutical expenditure can account for a high proportion of the total health expenditure of the country.

The main aim of the study is to evaluate the management of essential drugs in the public health facilities in Uganda. This is a cross-sectional study carried out in the districts of Kampala and Mbale employing both qualitative and quantitative methods. Standard outcome indicators as described in the WHO Operational Package for Monitoring and Assessing the Pharmaceutical Situation in Countries are adapted and used in this study. Data collection methods include semi-structured interviews with the key informants at the health facilities, review of the documents and physical inspection of the drug stores at the health centers.

The study findings show an average availability of 62.5% of the key drugs in the public health facilities. The average stock out duration of the basket of the key drugs is approximately 5 months. The inventory management is generally poor with only 36% of the records that coincide with the physical counts of the drugs. Only 20% of the staff is formally trained in the drug logistic management. The study further reveals that only 10% of the warehouses have adequate storage for the drugs.

The stock out of drugs at the health facilities is mainly attributed to poor drug financing and the inefficiencies in the drug distribution chain. The inefficiencies are mainly due to the rampant stock outs of drugs at the National Medical Stores and the delays in the supplies. Poor inventory control and poorly trained staff in drug logistic management also contribute to the poor drug management.

The study concludes with policy recommendations urging the government to improve on the monitoring and evaluation of the drug management in public health facilities. The study also recommends increased drug financing by the government and the improvement in the efficiency of the National Medical Stores in drug procurement and distribution.

TABLE OF CONTENTS

List of Tables

List of Figures

List of Boxes

List of Appendices

CHAPTER 1: BACKGROUND TO THE STUDY

1.1 Introduction

A significant portion of the pharmaceutical expenditures in developing countries is wasted due to inefficiencies associated with the management of the drug supplies, including drug selection, distribution and use (Govindaraj et al 2000). To enhance the efficiency of pharmaceutical resources and expand access to essential drugs, countries have been encouraged to develop and implement the policies of essential drugs. Since the first WHO model of essential drugs was published in 1997, over 140 countries have adopted the national essential drugs list. Despite this progress, many developing countries are still struggling to assure access to essential drugs. The proportion reaches 50% in the poorest parts of Africa and Asia (Govindaraj et al 2000).

Pecoul et al (1999) argues that essential drugs are the foundation for nearly every public health programme aimed at reducing morbidity and mortality in the developing world, and pharmaceutical expenditure can account for a high proportion of the total health expenditure of a country. The lack of access to essential drugs or vaccines because of economic reasons raises new human rights issues in a world that remains divided among wealthy countries, developing countries, and the rest of the world (Pecoul et al 1999).

Inadequate access to essential drugs in developing countries is also aggravated by problems in the pharmaceutical procurement and distribution systems (Govindaraj et al 2000). The causes of these problems include market failures (such as drug information), and government failures (associated with limited management capacity, weak management information systems, and poor warehouse and storage systems). The problems are compounded in some countries by widespread corruption in the public sector procurement and distribution systems, including in the health sector. The inefficient use of resources in public procurement systems represents an important motivation for health sector reform efforts (Govindaraj et al 2000).

In the area of supply and rational use of pharmaceuticals, there is still room for improvement. In most health systems, the potential for improving the supply process is

tremendous, reflecting in part the magnitude of current inefficiencies and waste. Lack of careful selection, incorrect quantification, high prices, poor quality, theft, improper storage, expiration of drugs, irrational prescribing, and correct use by patients results in losses totaling 70% of the original expenditure. Some drug management improvements require an initial investment in systems development, training, physical infrastructure, and other development initiatives. But the potential cost reductions and therapeutic improvements are dramatic. Even small improvements, when made in a number of related areas of drug management, can yield substantial overall savings (MSH 1997).

1.2 The pharmaceutical sector in Uganda

Uganda is a landlocked, equatorial East African country that borders the Democratic Republic of Congo, Kenya, Rwanda, Sudan, and Tanzania with Lake Victoria making up much of its southern border. Following a long period of, at times, violent political turmoil, Uganda developed a democratic constitution in 1995, and held presidential and parliamentary elections in1996 and 2001 (Leach et al 2005).

The United Nations estimates the population of Uganda at 24.2 million (2004) with 88 percent living in the rural areas. Classified as a low income country by the World Bank, Uganda is also classified as a Least Developed Country by the United Nations. Per capita income was reported at $240 in 2003, reflecting a continuing decrease. As of 2002 Uganda's total external debt amounted to $3.8 billion. This heavy debt service is one reason the country struggles to provide social services in adequate quantity and quality (Sachs et al 2004-1). The economy depends largely on agriculture, with 80 percent of Ugandans deriving their livelihoods from this sector. Currently, it is estimated that 35 percent of Ugandans live on less than a dollar a day and are unable to meet their basic requirements (Leach et al 2005).

1.2.1 The burden of disease

Like many countries in Sub-Saharan Africa, the issue of universal access to medicines has taken on a renewed urgency and visibility in recent years due to the AIDS, TB and malaria epidemics. However, these three diseases are not the only ones confronting people in this or any other part of the region. According to the Burden of Disease Study in Uganda, over

75% of the life years lost to premature death were due to ten preventable diseases. Perinatal and maternal conditions (20.4%), malaria (15.4%), acute lower respiratory tract conditions (10.5%), AIDS (9.1%) and diarrhea (8.4%) together account for over 60% of the national death burden. Others at the top of the list include tuberculosis, malnutrition (with 38% of under-5s stunted, 25% underweight for age and 5% wasted), trauma/accident and measles (Ministry of Health 1999). The health indicators are poor with the Infant Mortality Rate at 88 deaths per 1000 live births and the Maternal Mortality Ratio at 505 deaths per 1000,000 live births (Uganda Bureau of Statistics 2001).

1.2.2 The health system structure

Uganda is divided into 56 districts, and the health care system is aligned to the administrative structure shown in Table 1 below.

Table 1: Health Systems Structure

Description	Local Council Level	Corresponding Health Structure
Village	I	Health Centre I
Parish	II	Health Centre II
Sub county	III	Health Centre III
County as sub-district	IV	Health Centre IV
District	V	Health Centre V

Source: Ministry of Health, 2002

An updated (2004) health facility inventory is indicated in Table 2 below.

Table 2: Health Facility Inventory

	OWNERSHIP			
Level of facility	**Government**	**NGO**	**Private**	**Total**
Hospital	56	45	7	108
HC IV	148	9	3	160
HC III	706	157	10	873
HC II	945	391	257	1593
Total	***1855***	***600***	***274***	***2731***

Source: Ministry of Health 2004

Since 1972, the number of public, non-governmental and private health facilities has increased by 400 percent and the population has more than doubled. In spite of this, a 1993 inventory of health units found that geographical access to health care is limited to 49% of the population, i.e. population living within 5 kilometers of a health facility providing both curative and preventive health services. Rural communities are particularly affected

because health facilities are mostly located in towns and along main roads (Ministry of Health 2002a).

1.2.3 The National Drug Policy

The overall goal of the National Drug Policy in Uganda is to contribute to the attainment of good health for the population of Uganda, through ensuring the availability, accessibility and affordability at all times of essential drugs of appropriate quality, safety and efficacy, and by promoting their rational use. Other objectives of the National Drug Policy are to ensure availability of sufficient, suitable, trained pharmaceutical and other relevant staff to enable effective implementation of the NDP, and to optimize use of available resources, knowledge and expertise in the implementation of NDP through the establishment of an active patternship between the community, government bodies and private health providers involved in the pharmaceutical sector and through co-operation with regional and international agencies (NDP 2002b).

1.2.4 The drug supply system

One of the policy areas of the NDP is to establish and maintain a secure, cost-effective supply system in order to ensure that required essential drugs are available and accessible to the population and that the quality is maintained up to the point of use. This is achieved through timely quantification of the country's drug requirements, by maintaining constant availability at all levels of adequate quantities of the required essential drugs, by ensuring that all drugs are appropriately, cost-effectively and safely stored at all levels in order to maintain quality and minimize storage related costs and drug losses from whatever cause, and lastly to establish and constant availability of required essential drugs throughout the country (NDP 2002b).

Prior to the establishment of the National Medical Stores in 1993, the essential drugs were managed by the Uganda Essential Drugs Management Programme. The Uganda Essential Drugs Management Programme (UEDMP) began in 1985 with the assistance of DANIDA and the Danish Red Cross to provide rural health facilities with essential drugs. Initially conceived as an emergence programme to provide stocks of basic pharmaceuticals to rural health facilities which had for years been without drugs, it soon became the main source of

drugs for the whole country. Until the introduction of the UEDMP, the government had only been able to provide a dozen or so of the 277 items on the essential drugs list (Okuonzi et al 1995). The Essential Drugs Management Programme had operational inefficiencies because of lack of an enabling legal framework. In order to counteract this, the National Drug Policy was enacted in 1993 (National Drug Policy and Authority Statute 1993).

Consequently upon the establishment of the National Drug Policy, the National Medical Stores (NMS), which is an autonomous drug supply agency, responsible for supplying drugs to public health facilities was created. The institutional role and responsibility of the National Medical Stores for the public sector drug procurement and supply, was for the first time, formalized through signing of a memorandum of understanding between the ministry of health and the National Medical Stores in 2003. To improve efficiency of the drug supply system, the new "Pull" system was introduced country-wide in January 2003 to replace the essential drugs kit (PUSH system). The "Pull" system is a demand based ordering system where, the credit lines were linked to a logistic system that included scheduled ordering and delivery (Ministry Of Health, 2004a). Despite all these initiatives fore mentioned, problems still remain in the areas of drug management in the public health facilities.

1.3 Problem statement

In order to improve access to essential drugs at the public health facilities in Uganda, there has been an increased budgetary allocation for drug procurement by the government. In addition, the pull system was adopted with the hope of improving the availability of drugs at the health facility level which would also translate into improved access to drugs and utilization of the public health facilities.

However, challenges still exist. Routine monitoring and surveys have established irregular drug procurement and below target expenditure on drugs compared to the indicative cash budget. This falls far below 50% of the Primary Health Care Conditional Grant Guidelines, medicines expenditure. This state of affairs is attributable to re-allocation of funds, irregular ordering, and/ or sub-optimal service level at National Medical Stores. In addition,

some districts and hospitals and hospitals were found to be purchasing from the private sector. This brings into question the issues of value for money and also the quality of the products being procured (Ministry of Health, Uganda 2004a).

Apart from the problems of financing, the public drug supply system in many countries including Uganda continues to be plagued by ineffective management systems, lack of staff incentives, inability to control fraud and abuse, political pressures that channel drug supplies to better off areas, and inefficient drug selection and use (MSH 1997). Therefore, effective drug management is a prerequisite to improve access to essential drugs at public health facilities which is the main focus of this study.

1.4 Rationale and justification of the research

Given the evidence of persistent poor drug management in public health facilities, the search for an effective drug management system remains a key concern in Uganda. It is hoped that the results of this study will reveal where some of the major problems lie. This should enable the policy makers to take the relevant corrective measures and avert the chronic problem of drug mismanagement and misallocation of public resources.

1.5 Aim and objectives of the study

The aim of the study is to evaluate the management of essential drugs in the public health facilities in Uganda.

1.5.1 Specific objectives of the study are to:

i. Find out whether the key essential drugs are always available at the health facilities and if not, establish the major causes.
ii. Establish the average time period in which the key drugs at the public health facilities are out of stock and the average time between requisition and delivery of the drugs (lead time).
iii. Explore whether the drugs at the health facilities are safe, and of good quality.
iv. Find out whether effective inventory control systems are in place; establish levels of qualification of staff in charge of drug stores and the suppliers of drugs.
v. Suggest ways of improving drug management at the public health facilities.

1.6 Outline of the dissertation

The dissertation is structured as follows:

In Chapter 2, the theoretical and empirical literature review is presented. This mainly looks at the drug supply, the essential drug concept and the factors that affect access to the essential drugs. It also looks at studies carried out on drug management in different countries.

In Chapter 3, the conceptual framework for analyzing the drug management at the public health facilities is presented. This is followed by the methods used to obtain the data and the methodology for analysis.

Chapter 4 presents the findings of the study. Both quantitative and qualitative data for each of the pharmaceutical indicators used in this study are presented. The results are summarized in tables and graphs.

The key findings concerning the drug management are discussed in Chapter 5. The implications for the observed trends and the explanations are also given.

Finally, Chapter 6 offers conclusions from the study followed by policy recommendations, which spell out the different alternatives that can be pursued to improve the drug management at the public health facilities in Uganda.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter describes the theoretical underpinnings that guided the study, and also discusses other studies carried out on the same topic in other countries. It also looks at the literature that was useful in drawing up the methodology and enabled the researcher to make informed discussions and recommendations. The drug management cycle, the concept of essential drugs and the access to essential drugs in developing countries is also reviewed.

2.2 Public health objectives and essential drugs concept

Public health is concerned with using available resources to achieve maximum health improvements for the population. The perspective is not that of the individual patient, who may well benefit from a costly drug, but of the entire community or population, which benefit, if safe and effective drugs are accessible to all who need them. In 1975, WHO defined essential drugs as "indispensable and necessary for the health needs of the population. They should be available at all times, in the proper dosage forms, to all segments of the society". And in 1978, the WHO conference at Alma Ata recognized essential drugs as one of eight elements of primary health care (MSH 1997).

Essential medicines are those that satisfy the priority health care needs of the population. They are selected with due regard to public health relevance, evidence on efficacy and safety, and comparative cost-effectiveness. Essential medicines are intended to be available within the context of functioning health systems at all times in adequate amounts, in the appropriate dosage forms, with assured quality and adequate information, and at a price the individual and the community can afford. The implementation of the concept of essential medicines is intended to be flexible and adaptable to many different situations; exactly which medicines are regarded as essential remains a national responsibly. Careful selection of a limited range of essential medicines results in a higher quality of care, better management of medicines (including improved quality of prescribed medicines), and more cost-effective use of health resources (WHO 2002a).

The WHO Model List of essential Medicines has been updated every two years since 1977. The Model List and its procedures are meant as a guide for the development of national and institutional medicine lists. Most countries have national lists and some have provincial or state lists as well. National lists of essential medicines usually relate closely to national guidelines for clinical care practice which are used for the training and supervision of health workers. Lists of essential medicines also guide the procurement and supply of medicines in the public sector schemes that reimburse medicine costs, medicine donations, and local medicine production (WHO 2002a).

As a model product, the WHO Model list aims to identify cost-effective medicines for priority conditions, together with the reasons for their inclusion, linked to evidence-based critical guidelines and with special emphasis on public health aspects and considerations of value for money. The core list presents a list of minimum medicine needs for a basic health care system, listing the most efficacious, safe and cost-effective medicines for priority for priority conditions. Priority conditions are selected on the basis of the current and estimated future public health relevance, and potential for safe and cost-effective treatment (WHO 2002a).

The World Health Organization (WHO) has promoted the concept of essential drugs to advance health equity through expanded access to basic medicines for the poor in poor countries (Reich 2000). The essential drug list is mainly composed of generic drugs which have a potential advantage over the branded ones in terms of prices. Generic drug programmes are today the most relevant economic strategy for drug supply. The most important economic feature of generic drugs, unlike the situation with named brands, is that they allow for competition among the producers of a given drug (Antezanna et al 996). Competitive bulk procurement by generic name is a central feature of most essential drug programmes as well as many large hospitals and health services in high income countries (Bennet et al1997). Generic drug prices in well developed European markets are more typically 60-70% of brand prices (Balance 1992). The prescription, dispensing, and even substitution that is promoted in many countries allows for significant cut in the cost of drugs and health services.

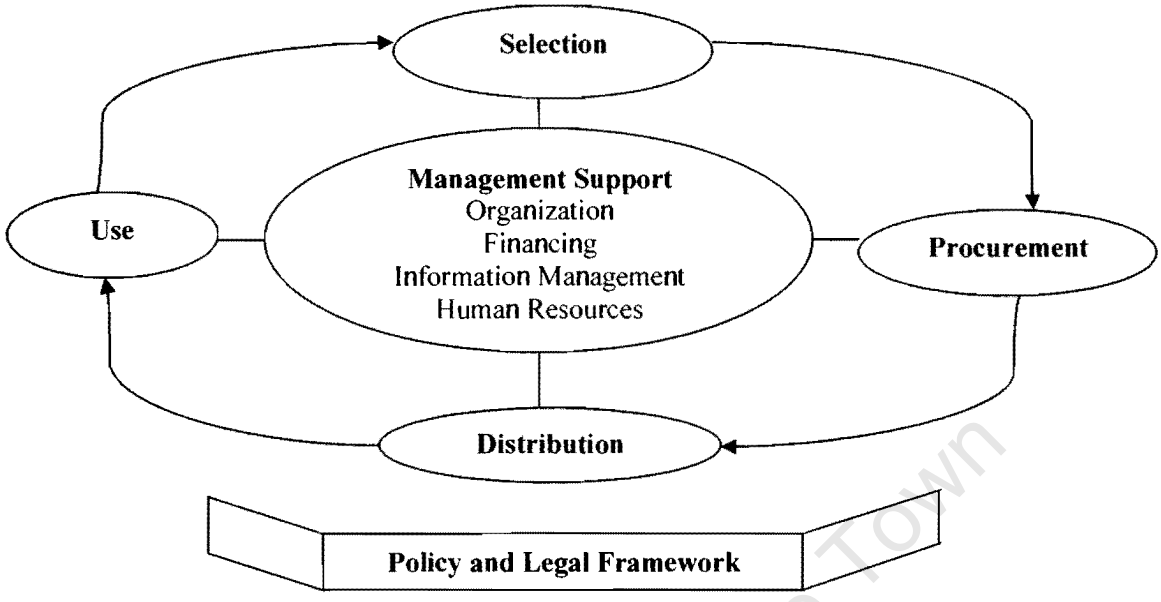
In order to be consistent with a public health perspective, the implementation of the essential drug concept the adoption of national drug policies and through practical drug management improvements which requires total government commitment.

2.3 The drug logistics system

The drug logistics system is the system responsible for ensuring that drugs move from where they are manufactured to the intended user that is the patient or the client. It involves activities such as transportation, storage, maintaining adequate supplies and keeping accurate records of drugs. Different personnel manage the various aspects of the logistic system, but the overall objective is to ensure that drugs are available at service delivery points at all times and that these drugs are the right amount, of good quality, and the essential drugs needed by the particular community being served (MSH 1997, Ministry of Health 2002c).

The drug logistic system is part of the drug management cycle, which is built around four pillars namely: selection, procurement, distribution and use. Each of the major pillars builds on the previous function and leads logically to the next (MSH 1997, Ministry of Health 2002c). The supply and management of drugs is a continuous process that is illustrated in Figure 1 below.

Figure 1: The Drug Management Cycle



Source: MSH, 1997

The selection of drugs involves deciding on the list of drugs to satisfy the health care needs of the majority of the population. To select the most appropriate drugs, selection teams depend on the current information on common illnesses, budget limits and pharmaceutical advances, as well as on input from health workers. In this way, contributions from the procurement, distribution and use of the components of the cycle inform the selection process and keep the drug management cycle in motion. Also selecting the most useful drugs avoids wasting scarce resources on unnecessary, unsafe or ineffective drugs (MSH 1997, Ministry of Health 2002c). Most small countries generally base their drug requirements on past consumption as data on drug utilization and morbidity are usually lacking (WHO 2002c).

Procurement is the process of acquiring drugs from private or public suppliers. Drug availability and costs are very much dependent on the effectiveness of a procurement system. Strong procurement processes ensure that selected drugs are purchased at reasonable prices, are of acceptable quality and in the right quantity. Procurement strategies vary widely, but most models include the following critical activities; drug needs quantification, bid management, supplier selection and drug quality assurance (MSH 1997).

The distribution process begins when drugs are sent from the manufacturer or supplier and ends when the drug consumption information is sent back to the procurement unit. An effective distribution system is the cornerstone of the drug logistics management. Such a system should not only maintain constant supply of drugs but also:

- keep the drug in good condition throughout the distribution process;
- minimize losses due to spoilage and expiry;
- maintain accurate records;
- reduce theft and fraud; and
- provide information for forecasting future drug needs.

When distribution systems function well and are supported by good procurement practices, patients are more likely to receive the necessary drugs on time and in good condition. The best systems are probably based on a combination of public and private management. For example, the transport of drugs and supplies can often be done better by private transport companies. In all cases, distribution and storage should be monitored to ensure the quality of drugs at all levels of the distribution network (WHO 2002b, Ministry of Health 2002c).

Implementing best practices in inventory management can improve overall service levels and reduce costs in the drug supply chain. Two methods stand out, which, which are defined by the level of the supply chain that orders drugs. In a pull system, each level of the supply chain determines the drugs and the quantity to be ordered by using the formula that considers demand patterns, distribution frequencies, costs, inventory levels and other relevant factors. This is preferred method because it allows more flexibility and orders are sent based on real consumption data. In a push system, a higher level in a supply chain determines the drugs and their quantity. This approach is only recommended in relief situations when there is insufficient lower lever staff to determine orders (Kearney Inc. 2004). The drug trucking study carried out in Uganda in August 2002 indicated sub-optimal levels of drug procurement at the Health Sub-District (HSD) level. There were also significant performance differences between the HSDs depending on the procurement system adopted at the district level and the logistic management capacity at the HSD level. In the new pull system, the credit lines were linked to a logistic system that included

ordering and delivery. The new pull system was introduced country wide in January 2003 to replace the essential drug kits (Ministry of Health 2003a).

Additionally, other inventory management techniques must be handled, including defining stock records, selecting items to be stocked, maintaining a balance between service levels, and adopting a model for re-ordering medicines (Kearney Inc. 2004). An appropriate supply interval is determined depending on which choice is made between the push and pull systems. This will determine whether deliveries are made to user units quarterly, monthly, weekly or at any other time. If deliveries are made weekly, average stock levels will be low and the likelihood of stock outs will decrease, but transport costs will be high. If deliveries are made only once a year, transport costs will be so low, but the average stocks and storage costs will be high. The optimum re-supply interval needs to be worked out to suit individual programme needs. Most public programmes use intervals of one to three months (MSH 1997).

A prerequisite to adequate supply of medicines requires skilled people who are trained to manage the procurement process. These people, working from a central office must have a keen understanding of all aspects of the purchasing process and know how to prioritize medicines based on budgetary restrictions. In addition doctors and pharmacists must be able to develop an accurate demand forecast and manage inventory levels to ensure availability of drugs the various consumption points. Unfortunately, given the high turnover of personnel in many organizations, it is a challenge to hire and retain people with these skills. This is particularly problematic in developing countries where health managers are assigned through political networks. These people are not evaluated based on their performance and have little incentive to strive for efficient resource management (Kearney Inc. 2004).

Further more, incentives and performance measures, when used effectively, can encourage employees to act in the best interest of the patient. The World Health Report 2000 defines incentives for health workers as "all the rewards and punishments providers face as a consequence of the organizations in which they work, the institutions under which they operate, and the specific interventions they provide" (WHO 2000b). Health workers face a

hierarchy of incentives or disincentives generated by the work they do, the way they are paid, and the organizational and system context in which they work. Typically, incentives vary by type of employer: nongovernmental organization, public, or private. Pubic sector incentives tend to be the weakest because of resource constraints and bureaucratic rules on civil servant employment constrain the use of both financial and non-financial incentives (Hongoro et al 2003). If at all possible, positions that demand specific knowledge of medicine supply chains should be filled with professionals who have an academic background and experience in this area. These professionals should be evaluated on their performance based on a mix of indicators which include maintaining high service levels and achieving saving targets to managing budgets and should be rewarded for their efforts. In addition, information technology can be valuable in managing the supply of medicine, particularly tools that are designed to support more strategic and long-term supply chain decisions. For example, the more sophisticated applications on the market today permit administrators to evaluate different supply chain network scenarios that balance cost reduction with improving service levels. Other applications help optimize the number of deliveries and manage the daily distribution of medicines. These tools to integrate the needs of each hospital or health center while compensating for the restriction of the drug supply chain (Kearney Inc. 2004).

The logistic system delivers the correct drugs to the service delivery points. However, efforts in selection, procurement and distribution would be wasted if the drugs are not used rationally. Rational use of medicines is crucial to securing the effectiveness of a country's drug supply and is one of the best sources of saving in the medicine supply chain. Rational drug use requires that patients receive medications appropriate to their clinical needs, in doses that meet their individual requirements, for an adequate period of time, and the lowest cost for them and their community. Rational use of drugs promotes quality of care and cost-effective therapy. It helps to ensure that drugs are used only when they are needed, and that people understand what the medicines are for and how to use them. Policies to promote rational drug use need to address the prescribers, dispensers and consumers of drugs as well as manufactures and sellers, and traditional healers. All these actors have an import influence on how drugs are used. A variety of strategies and interventions are needed to influence drug use (WHO 2002b).

2.4 Access to essential medicines in developing countries

Access to medicines has taken a central debate in the international policy debate. It is increasingly viewed as a basic human right, which is evident in the light of the HIV/AIDS crisis that is devastating populations in the developing world, most accurately in Sub-Saharan Africa where as many as 29 million persons are infected with HIV/AIDS (UNAIDS and WHO 2002) and as little as 5 to 6 percent of the population currently have access to the medicines they need (Moatti et al 2002).

The Working Group on Access to Essential Medicines incorporated the WHO definition that provided the basis for the Millennium Development Goals indicator used to assess access: the proportion of the population with access to affordable, essential drugs on a sustainable basis is the percentage of the population that has access to a minimum of 20 of the essential drugs (Leach et al 2005). Access is defined as having drugs continuously available and affordable at public or private health facilities or drug outlets that are within one hour's walk of the population (WHO 1999).

Despite the progress in the last decades, the likelihood of a person having access to essential medicines is still affected greatly by that person's income level. The World's Medicines Situation found that people in poorer countries were much less likely to have access to these medicines was living in low-income countries. This is a disproportionate share of the global burden, given their estimates that low income countries account for approximately 60 percent of the world's population (WHO 2004). According to WHO, in 1999, roughly 80 percent of the global population without access to medicines was living in low income countries. In contrast, only 0.3 percent of those lacking access to essential medicines lived in high income countries, which account collectively for about 15 percent of the world's population. In global context, that 15 percent of the world's population consumes 91 percent of the medicines produced (WHO 2000). Of people living in low-income countries, nearly 40 percent did not have access to essential medicines in 1999 (WHO, 2004).

Geographically, the lack of access to essential medicines is especially severe and concentrated in Africa and India. In fact, 38 percent of people without access to essential

medicines live in India. Another 15 percent of the people without access live in African countries (WHO 2004). Together, India and Africa account for 53 percent of the world's population without access to essential medicines. Although the disease burden and mortality from preventable or curable illness is highest in African countries, pervasive poverty means that the continent's share of the global pharmaceutical market is slightly more than 1 percent (Leach et al 2005).

The lack of access to medicines throughout large proportions of the populations of most developing countries reflects both the lack of sufficient incentives for developing new medicines to target the communicable diseases that disproportionately afflict the poorest countries, as well as the inability to pay for and effectively distribute those that do exist. The result is what the U.K. government has called a "mismatch between pharmaceutical needs in developing countries and the current nature of the pharmaceutical market" (DFID 2004).

2.5 Barriers to access to essential medicines

The Working Group on Access to Essential Medicines pointed out six of the most important barriers to access. Inadequate national commitment to making healthcare a priority from the national to local levels remains one of the greatest barriers to increasing access to existing medicines. There are many reasons for this lack of prioritization. Key among them are lack of political will by policy makers to make needs of the poor a priority; donor programs that can skew or limit national governments' abilities to set health policy; debt servicing and conditionality for loans from international financial institutions that can further limit government responsiveness to basic social service needs of citizens; and unfortunately, the threat of corruption that continues in the healthcare sector at all levels (Leach et al 2005).

Cohen (2003) argues that corruption in any of the critical decision points in the pharmaceutical system can be detrimental to a country's ability to improve the health of its population by limiting access of the population to high quality medicines and thereby reducing the health gains associated with proper use of pharmaceuticals (Cohen 2003).

Providing health facilities with drug and medical supplies is a very complex process that involves a large variety of actors from both the private and public sectors. Government health ministries often lack the management skills required to write technical specifications, supervise competitive biding, and monitor and evaluate the contract performance. Corruption can occur at any stage of the process and influence decisions on the model of procurement (direct rather competitive), on criteria the type and volume of procured, and on specifications and selection criteria ultimately compromising access to essential quality medicines. Common corrupt practices in the procurement process include collusion among bidders resulting in higher prices for purchased medicine, kickbacks from suppliers and contractors reduce to reduce competition and influence the selection process, and bribes to public officials monitoring the winning contractor's performance. All these lead to cost overruns and low quality. Other forms of abuse, fraud and mismanagement can occur due to insufficient and monitoring capacity. In some cases, supplies do not meet the expected standards, or they are only partially delivered or not delivered at all. In a context where quality controls are difficult to exercise, an increasing lack of funds results in opportunities to sell low quality, expired, counterfeit and harmful drugs at cheaper prices. Corrupt procurement officers can also purchase sub-standard drugs in place of quality medicines and pocket the difference (www.u4.no/themes/healthmedicalsupplies.cfm).

Due to under-financed and badly managed systems, poor record keeping and ineffective monitoring and accounting mechanisms, large quantities of drugs and medical supplies are stolen from central stores and individual facilities, and are diverted for resale for personal gain in the private practices or on the black market (Ferinho et al 2004). This involves a variety of practices such as record falsification, dispensing drugs to "ghost patients", or simply pocketing the patients' payment (Vian 2002). Patients are directly affected in this process as they are forced to supply their own medication or, in the case of hospital in-patient stays, linens and food. This results in considerable leakage of public resources. Analyzing data from health centers in Uganda, McPake et al (1999) estimated that over two thirds of drugs meant for free distribution through the public sector was lost due to theft and leakage (McPake et al 1999). Distributing medical supplies to the health care facilities also involves managing an effective transportation system and preventing misappropriation

of fuel and vehicles for private on non-health related uses (www.u4.no/themes/healthmedicalsupplies.cfm).

Inadequate human resources for health, including pharmacists and pharmacy technicians, is a growing problem that, if unaddressed, threatens to undermine all the efforts to strengthen health systems and improve health care in much of the developing world. Education, information, and in-service training remain potent tools to change that situation. More needs to be done to identify what is needed to retain skilled workers, especially in the face of mounting demands for health workers, such as nurses and pharmacists in the developed countries (Leach et al 2005).

Furthermore, the international community has not provided adequate finance nor consistently fulfilled its existing promises to developing countries. Some proposed actions have not been carried out at all and others have not been carried out effectively. There is need for increased levels of long-term financial support from the world community. It remains an unfortunate ongoing reality that some of the world's wealthiest countries remain the farthest from achieving their longstanding commitment to the development assistance target of 0.7 percent of the gross domestic product (Leach et al 2005).

Lee et al (1993) argues that drugs are not available to the majority of the population because of amongst other problems, inadequate financial resources (Lee et al 1993). Indeed, the overall health spending in the least developed countries is very low, even reaching US$2 per capita per year in some such nations. Thus for the poorest countries, there are no resources available domestically to support access to quality health care for their populations (Bale 2001). In addition, many poor nations cannot afford to buy essential drugs for their people, since governments are already over burdened with foreign loans from the International Monetary Fund and World Bank. Since drug companies invest heavily in research and would like to recover their cost with profit, many of the newly discovered formulations become prohibitively expensive for poorer countries (Pecoul et al 1999, Nambiar 2003).

In Uganda, a five year National Pharmaceutical Sector strategic Sector Plan for fiscal 2003-07 has been developed. The overall per capita minimum expenditure for basic healthcare

provision is estimated to be US$ 28 per person. Current spending is expected to be a small fraction of this. Funding for medicine in 2003/03 was US$ 1.20 per capita, which is only one-third of the estimated US$ 3.5 per capita needed (excluding the pentavalent vaccine that is currently donated and anti-retrovirals). The midterm review concludes that this shortfall poses a serious threat to sustained availability of essential medicines and health supplies and hence to the delivery of the Uganda National Minimum Healthcare Package (Caines et al 2003).

Also a persistent lack of coordination of international aid reduces access to medicines. Most poor countries will require significant donor funding to achieve universal access to essential medicines. They will also need much better aid coordination to avoid unnecessarily heavy reporting requirements and to avoid resource-wasting duplication of efforts. Sectorwide approaches should be used to promote improved coordination. Donors should commit aid that strengthens existing systems that are proactively target the poorest and rural areas, and avoids vertical programming by disease or by a given donor (Leach et al 2005).

Another factor which complicates further the inadequate access to drugs is that of weak health structure: in rural areas even the access to medical centers is limited and selective (Cohen 2003 and Bapna et al 1989). There are two major types of health facilities in most developing countries: referral hospitals and primary health care centers. Normally, patients are expected to visit their nearest Primary Health Care centers from where they may be referred to a referral hospital, which is generally situated in a more urbanized area. However, due to an inadequate and irregular supply of medicines to primary heath care centers, referral hospitals are often overloaded. For example, most drugs in developing countries are diverted to urban areas, regardless of the fact that most inhabitants of these countries live in rural areas. This overloading of referral hospitals is one of the commonest malfunctions of health services in developing countries (Bapna et al 1989).

Another area that needs some scrutiny is the implementation of intellectual property rights. With large companies holding on to their patent rights, poorer nations cannot manufacture these medicines more cheaply by themselves, even if they have the resources. Prices could

be lowered if the current rules awarding the original patent holders were relaxed and many drug policies deregulated (Wiedenmayer 2004).

The current incentive structure is inadequate to promote research and development of medicines and vaccines to address priority health problems of developing countries. For a number of the most neglected diseases (such as African trypanosomiasis, Chaga disease, leishmaniasis, and dengue fever), which primarily occur in developing countries, new medicines need to be developed (WHO and IFPMA 2001). For others, new medicines are needed to address shortcomings of existing treatments, such as safety, efficacy, appropriate dosing, length of treatment, and the ongoing threat of drug resistance. Despite progress in funding research and development (R&D) for new medicines for neglected diseases, with notable contributions from philanthropic foundations and some governments and pharmaceutical companies, more financial resources need to be mobilized in a sustainable way to create a strong and sustainable pipeline of new products (Leach et al 2005).

2.6 Strategies to promote access to essential drugs

Since the issues surrounding barriers to access have many causes, a single solution to improving the provision of medicines cannot be expected to succeed; it must be complemented by others. What this means is that every developing country should have an overall medicines policy and strategy founded on the essential medicines concept. The aim of such a policy has been succinctly defined as existing to ensure that "safe" and effective drugs of good quality are available and affordable to the entire population and that they are rationally used" (World Bank 1993).

National medicines policy cannot succeed in isolation from broader health policies and government policies in general. A ministry of health is unlikely to succeed in this area unless it has clear and acceptable understandings reached with other government departments dealing with such matters as finance; and practices regarding trade, taxation, and customs duties, all of which are likely to have a positive or negative impacts on the supply of medicines (Leach et al 2005).

Regular availability of drugs in health care facilities is a basic component of a well functioning health system from the perspective of policy makers and providers. It has been

shown that cost recovery accompanied by a fair supply of essential drugs and by better motivated staff improved the efficiency of the health system in Cameroon (Audibert et al 2000). The use of market mechanisms is often advocated as means to improve public sector efficiency (World Bank 1993). Promotion of the private sector may be seen as means to bring extra funds into the pharmaceutical sector and to improve the availability of drugs (Bennet et al). Today, countries such as Benin, Columbia, Guatemala, South Africa and Thailand have developed different combinations of public and private centralized and decentralized approaches to drug supply (Quick 2003).

2.7 The WHO survey package for monitoring and assessment of country pharmaceutical situation

It is important for governments in developing countries to implement more effective drug procurement systems in order to guarantee regular access to good quality essential drugs. Monitoring of drug use provides important information as to whether access to drug planning and strategies are satisfactory or whether they need to be modified or even reworked. Monitoring is therefore crucial to successful implementation of national drug policies, programs and strategies and to achieving a rational use of quality drugs.

In order to facilitate this process, a WHO survey package to facilitate monitoring and assessment of country pharmaceutical situations was developed in 2002. It provides cost-effective means of determining availability of essential drugs, the safety, efficacy, and quality of medicines and whether they are used regularly. The package includes structural, process and outcome indicators (Brudon et al 1999).

In this study, only some of the outcome indicators were used. They provide quantitative information on the achievements of the four objectives of the National Drug Policy, which are; availability, affordability, quality and the rational use of drugs. These indicators measure the degree to which these objectives are being attained (Brudon et al 1999).

The outcome indicators do not provide information why results are good and bad; this could partly be obtained through the analysis of the structural and process indicators. It is reasonable to assume that if good results on the process indicators, then the outcome indicators should also show positive results or improvement over time. If outcome

indicators provide evidence on significant problems, when the structural and process indicators show good results, then decision makers should undertake a careful analysis of the problems, to identify causal factors and revise strategies accordingly. These outcome indicators are measured by percentage or Figure based on information available at the central level and or obtained through surveys. The indicators can be used for assisting national and international decision makers in measuring the results of policies and implementation strategies. They can also be used in comparing pharmaceutical policies of different countries (Brudon et al 1999).

By the end of 2002, the WHO survey package had been field tested in 16 countries representing all six WHO regions. Use of the package in Bulgaria, revealed that availability of key essential medicines was high and had increased since 1995. It further revealed that less than 50% of the medicines prescribed were on Bulgaria's essential medicines list and this requires improved rational use of drugs. In the Philippines, it was revealed that the availability of essential drugs in rural health facilities had gone down possibly due to decentralization of health care services (Asamoa-Baah et al 2002).

In Africa, field-testing of the monitoring package was carried out in Ghana, Mali, Nigeria, Tanzania, and Uganda. In Uganda, the Ministry of Health in collaboration with WHO, carried out a baseline survey to assess Uganda's pharmaceutical situation. In terms of access, the situation assessment revealed that availability of key medicines varied nearly two fold public health facilities and five-fold among district warehouses (Asamoa-Baah et al 2002, Ministry of Health 2002). In Tanzania, use of the household survey showed that households are most likely to self medicate and use public health facilities, and use of public health facilities is not confined to lower economic groups. More than 50% of the lowest economic group could not obtain all the medicine they needed (Asamoa-Baah et al 2002).

In addition, a study to evaluate access to essential medicines was carried out in Malaysia. The methodology used was adopted from the World Health Organization study protocol. Access was measured in terms of the availability and affordability of essential medicines, especially to the poor and in the public sector. The first survey in the public health clinics

and public district drug stores gathered information about current availability of essential medicines, prevalence of stock-outs and affordability of treatment (expect drug stores). The second survey assessed affordability of treatment in public health clinics and private retail pharmacies. The results revealed that the average availability of key medicines in the public health clinics for the country was 95.4%. The average stock-out duration of key medicines was 6.5 days. However, average availability of key medicines in the public district drug stores was 89.2%; with average stock-out duration of 32.4 days. Medicines affordability for public health clinics was 1.5 weeks salary and for the private pharmacies 3.7 weeks salary. The study concluded that the majority of the population in Malaysia had access to affordable essential medicines (Saleh et al 2005)

2.8 Other international related studies in the same field

In Kenya a study to find out the availability of antimalarials in government and mission health facilities was carried out by the Rational Pharmaceutical Management Plus(RPM Plus) Program of the Management Science for Health(MSH) in collaboration with Ministry of Health Kenya. The methodology for this assessment was based on the Pharmaceutical Management for Malaria (PMM) Manual an indicator based assessment tool developed by the Rational Pharmaceutical Management Plus Program in collaboration with USAID. The PMM manual is designed to guide the review of medicines availability and the patterns of use of medicines for malaria treatment in public health facilities, private facilities, pharmacies and retail medicine outlets. This particular assessment was limited to the drug availability study (DAS) within the manual. Within the study, four PMM indicators focusing on procurement and distribution was used to asses the availability of antimaralial medicines within the government and mission sector of Kenya (Tetteh et al 2004).

The study revealed that overall, in the government health facilities, antimalarial medicines were out of stock an average of 41 percent of the time within the specified year. The average percentage of the district hospital records corresponding with physical counts was 80.36 percent, 49.06 percent for health centers and 43.44 for dispensaries (Tetteh et al 2004).

The Rational Pharmaceutical Management Plus also carried out a study in Nigeria to assess the availability and use of antimalarials within the public and private sectors. The objective of the study was to identify any bottlenecks in the antimalarial pharmaceutical supply system and to identify appropriate points of intervention. The assessment would then propose interventions to address the identified problems prior to and during the implementation of the new policy with an aim to ensure availability and proper use of the selected artemisinin-based combination therapy (ACT) for the treatment of malaria. This was a rapid assessment based on the Drug Management for Malaria (DMM) Manual, an indicator tool also developed by the RPM project, in collaboration with USAID. The assessment was built around two complementary studies, a Drug Availability Study (DAS) and a Drug use Study (DUS). This rapid assessment highlighted some of the challenges in the Nigeria's pharmaceutical management system and shows that all areas of the pharmaceutical management cycle need to be strengthened. In summary, the key challenges observed by the rapid assessment included: unconsolidated procurement of medicines, inadequate inventory and stock management, poor record-keeping in facilities and frequent stock-outs of antimaralial drugs (Tetteh et al 2005).

In addition, the Rational Pharmaceutical Management Plus (RPM Plus) Program of Management Sciences for Health (MSH) conducted an assessment on Health Commodity Management in Rwanda. The assessment addressed commodity management issues related to pharmacy and laboratory activities, both of which include elements of a comprehensive HIV/AIDS prevention and treatment program. Pharmaceutical based indicators already tested by WHO and RPM and other organizations were used. The data analysis was done according to seven main variables which included; human resource training and levels, availability and access to key health commodities, state infrastructure, and functionality of the management information system among others. The results on the drug availability show that among the respondents providing information on stock outs for a list of tracer drugs (25%), none of the referral hospitals reported having experienced stock outs of essential drugs during a 12 month period. Only 37% of the facilities reported having experienced shortages among essential drugs. No clear pattern emerged for stock-outs of particular drugs. However, lack of inventory control data and poor record keeping made it difficult to assess the true extent of stock out in these institutions (Lijdsman et al 2004).

Using the Drug Management for Childhood Illness (DCMI) Manual also developed by the RPM project, Gabra et al (2000) evaluated drug availability and use in Uganda. The DCMI methodology is based on 20 indicators and the reference manual includes four supplemental indicators that are optional. Combined, the indicators describe the degree to which drug availability and use affect the Integrated Management of Childhood Illness (IMCI) implementation in the country being studied. In the surveyed facilities, 66 percent of the tracer drugs were available. The inventory records of the 66 percent of the records of the surveyed health facilities did not correspond with physical stock (Gabra et al 2000).

In Nigeria, according to Uzochukwu et al (2002), it was observed that the facilities which had received the Bamako-Initiative drug revolving fund had a better availability of essential drugs both in number and average stock compared to those which did not receive the fund. Retrospective and cross-sectional methods were used to collect data form all the 33 primary health centers. The data collected included listing tracer drugs in stock at the time of visit. (Uzochukwu et al 2002).

Enhancing access to medicines needs concerted action and can only be tackled with the commitment of the actors involved. WHO has proposed a framework of complementary approaches for collective action. The four components of this framework are: rational selection, affordable prices, sustainable financing, and reliable supply systems. Other strategies needed to support these components include National Drug Policies, Public-private partnerships, strengthening of human resources and the reorientation of the research agenda (Wiedenmayer 2004).

2.9 Summary

This chapter has given a review of literature with regard to drug management at public health facilities. An overview of the drug management cycle has been explored. The essential drug concept and access to essential drugs in developing countries has also been documented. The literature shows that most studies in this area have used standard indicators to evaluate drug management. Indicators developed by WHO and RPM Plus have been used in several countries in Africa, Asia and Latin America. The literature review has mainly relied on reports and studies from international organizations and to a

lesser extent on peer-reviewed journals due to the limited empirical evidence available in this field.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides a conceptual framework used to analyze the drug management at the public health facilities. A detailed description of the methodology used to collect both qualitative and quantitative data, the nature and sources of the data and how such data will be integrated for the later stage of analysis is also presented.

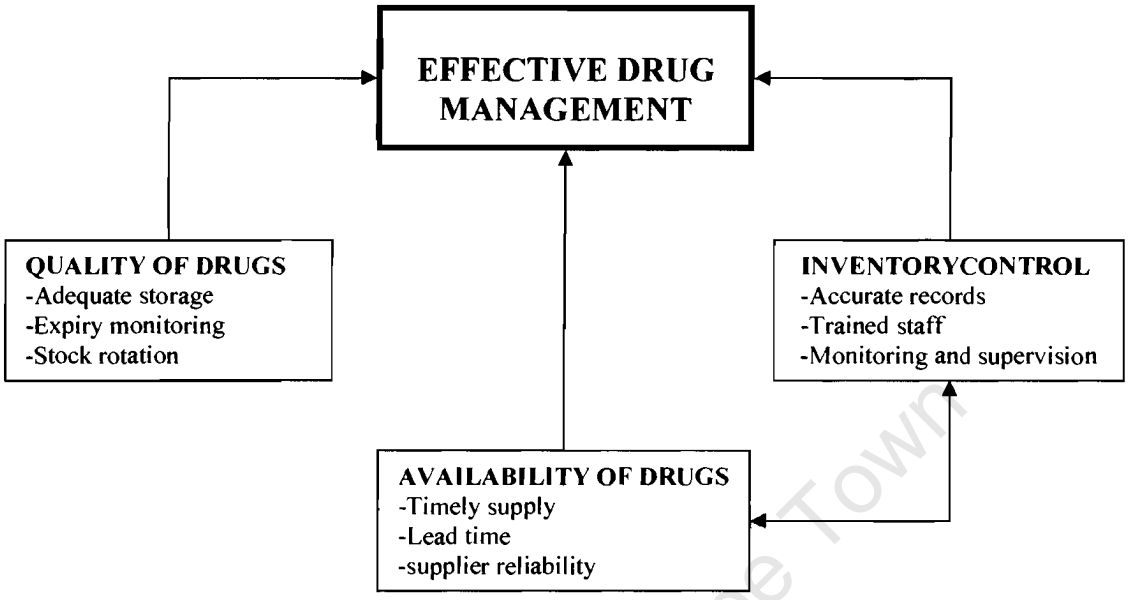
3.2 Conceptual framework

Managing drug supply at facility level directly affects the quality of health care. If drugs are consistently unavailable, patients suffer and staff loose motivation. Everyone looses confidence in the health system, and patient attendance decreases. A constant drug supply promotes effective care, inspires confidence in the health facility, and contributes to job satisfaction and self-esteem among staff. Every health facility, however large or small, needs to store and manage its drug stocks. There must be systems to ensure; secure storage, storage in correct environmental conditions, accurate record keeping, effective reordering, effective stock rotation and expiry monitoring, and effective fire and theft prevention (MSH, 1997).

Good inventory control makes ordering and drug management easier. Essential drug programs place a high priority on improving inventory control to ensure reliable supply of essential drugs, vaccines and other items at health facilities. Accurate and current stock records are essential to good inventory management. They are a source of information to calculate needs, and inaccurate records produce inaccurate need estimates (and problems with stock outs and expiry). A prerequisite for good inventory control is the training of staff in inventory management (MSH, 1997).

Availability of drugs at the health facilities also depends on drug use pattern. Irrational prescribing habits often lead to misuse of drugs and wastage of resources. This mainly depends on the availability of trained medical personnel. In order to ensure rational drug use, continuous training and standard treatment guidelines should be put in place. The factors influencing drug management are closely interrelated. The Figure 2 illustrates the linkage among these factors.

Figure 2: Conceptual Framework



3.3 Study design

A descriptive and analytical cross-sectional study design was used in this research. Data was collected at one point in time and tried to describe the situation at that particular time. This was preferred because it provides a rich source of information in a short period of time.

3.4 Sampling strategy

The country was stratified into rural and urban regions. Two districts, Kampala and Mbale (now divided into two) were purposively selected, one from each region. Compared to other districts, Kampala has more developed infrastructure. The NMS which is the main supplier of the essential drugs to public health facilities is also located near Kampala. The health centers are easily accessible and are run by better qualified staff. It is assumed that availability, access and management of drugs is better in Kampala. Geographical access is not a major limiting factor. Kampala district has a total number of 15 public health facilities, which includes 4 hospitals, 2 Health Centers of level IV, 7 of level III, and 2 of level II. The district is divided into five administrative divisions of Nakawa, Kawempe, Makindye, Rubaga, and Central.

On the contrary, Mbale district, located in eastern Uganda, is further away from the NMS. Most of the health facilities are located in remote areas and are run by less qualified staff and are expected to experience more problems of supply and distribution of essential drugs. Geographical access is a limiting factor and therefore availability and access to essential drugs is expected to be relatively poor. Mbale district has got 6 health sub-districts and 45 government health facilities which includes 2 hospitals,3 Health Centers of level IV, 30 of level III and 10 level II.

From each district, 10 health facilities which included one hospital were selected. For Mbale district, the remaining 9 Health Centers were randomly selected by at least choosing one from each of the 6 health sub-districts. For Kampala district the remaining 9 health facilities were randomly selected from five divisions already mentioned. A numbered list of all units from which samples were to drawn (sampling frame) was made. The required number of sampling units was selected using a lottery method. All the units were assigned numbers which were mixed and the required number of health units at each level was drawn at random. To enable getting a representative sample from each level of care, the health facilities were stratified into the 4 categories of care as shown in Table 3 below.

Table 3: Districts and Health Facilities sampled

District	Hospital	HC IV	HCIII	*HCII*
Kampala	Old Mulago	Naguru Kawempe	Kiswa Komamboga Kitebi Kisenyi Kawala	Staff clinic Kirudu
Mbale	Mbale Hospital	Busiu Bufumbo	Lwangoli Maluku Nakaloke Siira Busamaga	Nasasa Namakwekwe

The higher level facilities are expected to use a wide variety of drugs. This is reflected in the Uganda Clinical Guidelines (Ministry of Health 2003b) and the Essential Drug List of Uganda (National Drug Authority 2001) both of which specify the level at which different drugs should be used.

The district hospital or HC IV acts as a referral facility for a Health Sub-District (HSD). The district hospital caters for a population of 500 000 people and HC IV 100 000 people. The leadership of the HSD is located in an existing hospital or a HC IV located within the HSD. Its functions are primarily:

- Provision of basic preventive, curative and rehabilitative care in the immediate catchments;
- Provision of second level referral services for the HSD including life saving medical, surgical and obstetrical emergency care such as blood transfusion, caesarian section, and other medical and surgical interventions; and,
- Provision of the physical base of the HSD Management Team.

The HC III offers continuous preventive, promotive and curative care and provides support supervision of the community and HC II under its jurisdiction. There are provisions for laboratory services for diagnosis, maternity care and first referral cover for the sub-county. It caters for a population of 200 000 people. The HC II represents the first level of interface between the formal health sector and the communities. The HC II provides only ambulatory services, except in strategic locations (e.g. poor access to HC III or HC IV) where interim strategy maternity services are being provided. It caters for a population 0f 5000 people (Ministry of Health 2005b).

3.5 Types of data collected

The data that was collected was mainly concerned with the management of essential drugs at the health facilities. The cross sectional data collected, the source and tools used is summarized in table 4.

Table 4: Data, Source and tools used for each objective

Objective	Information/data needed	Source	Tools
1	Availability of essential drugs at health centres Causes of drug shortages	Records Interviews	Survey forms* Semi-structured interviews
2	Safety, efficacy, and quality of drugs	Records	Survey forms*
3	Stock out duration and average time between re-ordering and delivery of drugs	Records and interviews	Semi-structured interviews and survey forms*
4	Presence of effective stock control system and alternative sources of drugs	Records and interviews	Survey forms* and semi-structured interviews
5	Qualification of staff in charge of warehouses	Records and interviews	Semi-structured interviews

*Source: Ministry of Health 2002. Adopted from WHO 2002

The key informants interviewed included an official from the NMS, an official from the pharmaceutical department Ministry of Health, an inspector of drugs, two district directors of health services, twenty heads of the health facilities and twenty personnel in charge of the drug warehouses.

3.6 Data collection methods

Both qualitative and quantitative data was collected. Data was gathered from facility records, through observations and interviews with key informants at the health facilities. Availability of the key essential drugs and the presence of expired drugs on the shelves were verified by physical inspection of the drugs in the warehouses and cross-checking with the stock records. Outcome indicators as described in the WHO operational Package for Monitoring and Assessing the Pharmaceutical Situation in Countries were used. Survey

forms from the same package were adapted and used to assess the following indicators: availability of key drugs, expiry of drugs, adequacy of storage facilities, and the stock out duration of drugs (Brudon et al 1999). Survey form 1 (see appendix A) consisting a list of 20 key drugs, was used to determine the availability and expiry of drugs for HC II and HC III. For the district hospitals and HC IV, survey form 2 (see appendix B) was used. The list of drug requirements for HC IV and the district hospitals was modified to cater for the additional drug requirements at this level of care. The list of key drugs was compiled used the Essential Drug List of Uganda (National Drug Authority 2001) and the Uganda Clinical Guidelines (Ministry of Health 2003b).

The percentage availability of the key drugs and the percentage of expired drugs at each health facility were calculated using the following formulas respectively:

$$\% \text{ of key drugs in stock} = \frac{\text{No. of key drugs in stock}}{\text{Total number of key drugs}} \times 100$$

$$\% \text{ of key drugs expired} = \frac{\text{No. of key drugs expired}}{\text{Total number of key drugs}} \times 100$$

Key informants were interviewed to find out the reasons for drug shortages and to suggest ways of improving drug availability (see appendix C and D).

In order to determine whether the warehouses were suitable for storage of drugs physical inspection was carried using survey form 5 (see appendix E). The form consists of a checklist which was used to rate the condition in each of the drug stores at each public health facility. The ratings for all the items on the check list were summed up to obtain the rating for each facility.

The stock out duration of the key drugs was determined by reviewing the stock cards for the six months period prior to the survey from June 1, 2005 to November 31, 2005. Facility staff was also interviewed for the same purpose. Survey form 6 (see appendix F) was used for HC II and III, while survey form 7 (see appendix G) was used for HC IV and district hospitals. The stock out duration of the drugs was calculated for each health facility following the procedure in the survey form 6 and 7 (see appendix F and G).

The proper functioning of the inventory control system was verified by cross-checking the accuracy of the stock records. At each health facility 15 stock cards of the key drugs were checked and the stock levels of the drugs recorded were compared with the actual physical stock available in the store. Where stock records and physical counts did not correspond, recent issues or receipts that had not been posted were reviewed and adjusted records were calculated. Survey form 8 and 9 were used (see appendix H and I). The percentage of the records that corresponded with the physical counts was calculated using the formula:

$$\% \text{ of records corresponding with physical counts} = \frac{\text{No. of records that correspond with physical counts}}{\text{Total number of documents reviewed}} \times 100$$

The qualifications of the personnel in charge of the drug warehouses were also verified through interviews and documentary evidence. The lead time and the main suppliers of drugs were verified through interviews and review of records which included purchase orders and delivery notes.

The availability of the Essential Drug List (EDL) and the Uganda Clinical Guidelines was also verified through the interview with the respondents at the health facilities. Only the copies that were physically present and intended for use as reference for the health workers were counted.

The results were compared to the international recognized performance indicators and performance targets as adopted from Management Science for Health (MSH). These indicators have been widely used for many years by MSH/RPM and other organizations such as WHO that have considerable expertise in drug related areas. Table 5 shows the details of the indicators and the performance targets.

Table 5: Indicators and the performance targets

Performance indicators	Performance targets
Health units: Indicator drugs available (unexpired)	90%
Health units: average stock out duration for indicator drugs	10 days
Stock records correspond with physical counts	90%
Average lead time from NMS to health units, routine orders	30 days
Health units with expired items	25%

Source: MSH, 1997

3.7 Data management and analysis

Data analysis was done immediately after the completion of data collection. Both qualitative and quantitative analysis was carried out. Data was entered manually from the survey forms into master spreadsheets, checked and cleaned by a system of double entries into twin spreadsheets for each survey form by separate members of the research team. After data entry, the spreadsheets were compared and cross-checked. The standard Microsoft office packages (Excel and Microsoft word) were used to analyse the data.

3.8 Ethical considerations

Before conducting the study, approval was requested from the Research and Ethics Committee of the University of Cape Town. On receipt of Research Ethics Committee approval, further authority to conduct the study and review relevant records in Uganda was obtained from the Ministry of Health, Uganda. Permission to review documents and extract data was sought from the relevant authority of the participating public health facilities. Semi-structured interviews were conducted with the key informants at the public health facilities after seeking consent thus ensuring autonomy of the persons involved in the study. A letter of consent (Appendix J) was read and signed by the participants as proof of consent to participate in the study. The participants were assured of the choice to withdraw

form the interview at any point in time. Since the retrieval of the information involved sensitive issues, participants were assured of their confidentiality.

3.9 Quality control (validity and reliability of results)

The interviews were conducted in English and all the survey instruments were written in English because all the participants had a good command of the English language owing to their level of education. In addition, English is the official language in Uganda.

A pilot study was conducted prior to data collection to test the reliability and validity of the survey instruments. In order to ensure completeness and clarity, all interview schedules were saturated to my supervisor for comments and they were tested prior to their use. The pilot study was carried out in 4 health centers. Reliability (ability to produce consistent results) was determined by re-administering the survey forms to each of the pilot premises using different research assistants and the results were compared.

Validity was evaluated by checking whether pilot study participants understood the questions and gave appropriate answers. The interviewer recorded questions that were not understood, or those that required further prompting or explanation. Participants were invited to comment on the questionnaire. Based on the feed back received from the pilot study the questionnaire was modified to improve its validity and reliability.

3.10 Summary

This chapter has presented the conceptual framework used to analyze the drug management at the public health facilities. The research methodology used to conduct the study has also been presented in detail describing the study design, the sampling strategy, type of data collected, and the data collection methods. In addition, the ethical issues and the quality control of the results were also discussed. The data was based on qualitative and quantitative primary and secondary data from the public health facilities and the key informants. Data was analyzed using Microsoft excel and narrative qualitative analysis.

CHAPTER 4: RESULTS OF THE STUDY

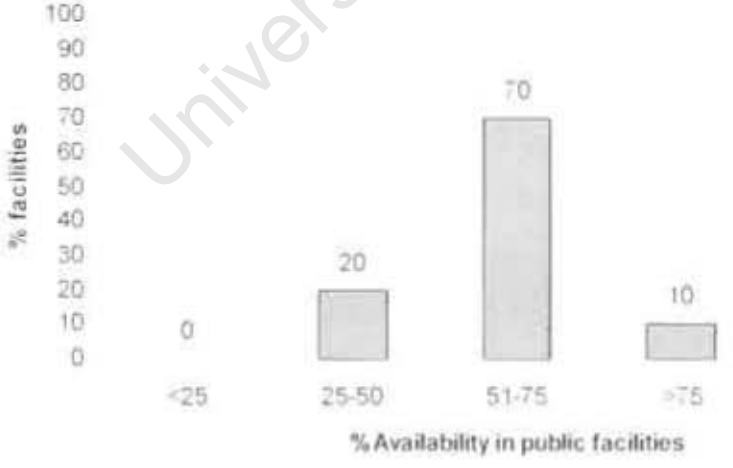
4.1 Introduction

The chapter describes the main findings of the study. The results presented include availability of key drugs at the public health facilities, stock out duration of the key drugs, average lead time, and quality of drugs at the public health facilities, inventory control system, and the main suppliers of drugs.

4.2 Availability of the key drugs at the public health facilities

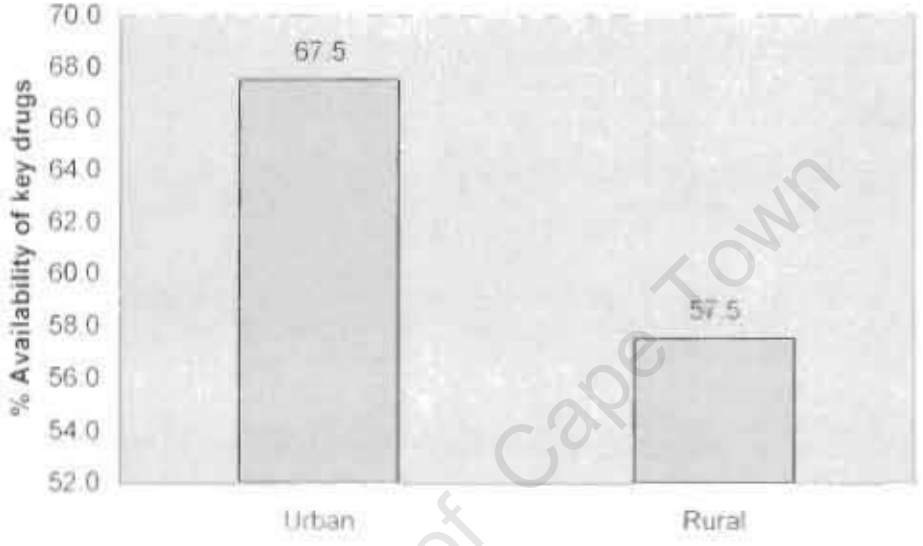
Essential drugs to treat common diseases should be available in all the health facilities especially in the public sector facilities providing health services to the poor. Results from the survey revealed that the average availability of the basket of key drugs in the public health facilities was 62.5% with a medium value of 62.5% and a range of 40% to 80%. Only 10% of the facilities were found to have greater than 75% availability of the basket of the key drugs; however, 15% of the facilities had less than 50% availability. The Figure 3 shows the graphical representation of the results.

Figure 3: Availability of the key drugs in public health facilities for Kampala and Mbale districts



The availability of the key drugs at the public health facilities was also compared for the urban and rural health facilities. The results indicate that availability of the key drugs was 67.5% for the urban health facilities compared to 57% for the urban health facilities. Figure 4 shows details of the results.

Figure 4: Rural-urban comparison of availability of the key drugs



The percentage of facilities in which each drug was available on the day of the survey was also calculated. The results for HC II and HC III combined and those of HC IV and the hospitals combined were presented separately. This separation was done because a similar list of essential drugs was used for HC II and HC III (see appendix A) which was different from that used for HC IV and the hospitals (see appendix B). The results of HC II and HC III combined indicate that benzoic acid + salicylic acid ointment, paracetamol syrup, and hydralazine injection, were not available in any of the health centers, while Magnesium sulphate injection and gentamicin injection were available in less than 50% of the health facilities. In addition, oral rehydration salts, methylergometrine injection, metronidazole tablets, and cotrimoxazole tablets were available in less than 75% of the health centers. The results further indicate that Acetysalicylic acid; Chloroquine tablets, Mebendazole tablets and Tetracycline eye ointment were available in 100% of the facilities. The overall average

was 62.2% with a range of 0 % to 100%. Table 6 shows the results of health centers II and III combined.

Table 6: Stock availability on the day of survey for health centers of level II and III in Kampala and Mbale Districts

Drugs	% of Health Centers in which the drug was available(n = 14)
1. Amoxicillin capsules 250mg	78.6
2.Acetysalicylic acid(aspirin)tablets 300mg	100.0
3.Chloroquine tablets 150mg base	100.0
4. Cotrimoxazole tablets 480mg	57.1
5. Ferrous sulphate/folic acid tablets 200mg/400mcg	92.9
6. Mebendazole tablets 200mg	100.0
7. Metronidazole tablets 200mg	50.0
8. Retinol(vitamin A) capsule 100,000 IU	85.7
9. Sulphadoxine/pyrimethamine tablets 500/250mg	92.7
10. Benzyl penicillin injection 1g(1MU)	85.7
11. Methylergometrine injection 200mcg/ml	57.1
12. Gentamicin injection 40mg/ml	35.7
13. Hydralazine injection 20mg/ml	0.0
14. Magnesium sulphate injection 50%	7.1
15. Measles vaccine	78.6
16. Medroxyprogesterone injection 150mg/ml	78.6
17. Benzoic acid + salicylic acid ointment 6%+3%	0.0
18. Paracetamol syrup 120mg/5ml	0.0
19. Oral rehydration salts(ORS)	64.3
20. Tetracycline eye ointment 1%	100.0

The results for the district hospital and HC IV show that paracetamol syrup, magnesium sulphate, were not available in any of the health centers, while hydralazine injection, ceftriaxone injection were only available in one health center (16.7%). Ciprofloxacin tablets, cotrimoxazole tablets, lidocaine HCL injection, methylergometrine injection and cimetidine tablets were available in less than of the health centers. The results also indicate that ketoconazole tablets, mebendazole tablets, quinine DI-HCL injection, clotrimazole cream and tetracycline eye ointment were available in 100% of the health facilities. The average was 63.3 with a range of 0% to 100%. Table 7 shows details of the results.

Table 7: Stock availability on the day of survey for HC IV and Hospitals in Kampala and Mbale districts

Drugs	% of Health Centers in which the drug was available(n = 6)
1. Amoxicillin capsules 250mg	83.3
2. Ciprofloxacin tablets 500mg	50.0
3. Quinine sulfate tablets 300mg	50.0
4. Cotrimoxazole tablets 480mg	83.3
5. Ketoconazole tablets 200mg	100.0
6. Mebendazole tablets 200mg	100.0
7. Metronidazole tablets 200mg	83.3
8. Lidocaine HCL injection 2%	50.0
9. Quinine DI-HCL injection 600mg/2ml	100.0
10. Ceftriaxone injection 1g	16.7
11. Methylergometrine injection 200mcg/ml	50.0
12. Gentamicin injection 40mg/ml	83.3
13. Hydralazine injection 20mg/ml	16.7
14. Magnesium sulphate injection 50%	0.0
15. Cimetidine tablets 200mg	66.7
16. Medroxyprogesterone injection 150mg/ml	83.3
17. Clotrimazole cream 1%	100.0
18. Paracetamol syrup 120mg/5ml	0.0
19. Sodium Chloride infusion 0.9%	50.0
20. Tetracycline eye ointment 1%	100.0

The key informants were interviewed to find why there are drug shortages in the health facilities. They included heads of the health units, personnel in charge of drug stores, the District Director of Health Services (DDHS), regional inspector of drugs, an officer from NMS, and the Ministry of health. The different categories of the respondents gave different opinions on the causes of drug shortages.

One of respondents from the NMS blamed the drug shortage at the health centers on the delays in getting orders from the districts. It was further noted that in some instances the NMS is unable to supply all what is requisitioned due stock outs of some drugs. This was attributed to the delays in the bureaucratic procurement process since more than 90% of the drugs used in the country are imported. A respondent from the Ministry of health was of the view that the drugs would be sufficient if the health centers had the capacity to make accurate assessment of their drug needs. The district officials interviewed shared the same views but he mainly blamed the shortage of drugs on insufficient funding and the delays in processing orders by the health units and the delays in delivery by the NMS.

When asked comment on the drug shortages, the inspector of drugs mainly emphasized lack of accountability, poor record keeping, lack of trained personnel, poor staff motivation, and the irrational use of drugs as the main causes of drug shortages. The respondents at the health centers when asked put the blame on the lack of efficiency by the NMS. It was reported that in most cases there are delays in delivery, partial deliveries due to stock out at NMS. Inadequate finance and delays in the release of funds was also cited as one the reasons. Box 1 summarizes the main reasons for the drug shortages.

Box 1: Reasons for the drug shortages

1	Delays in the requisition of drugs by the health units and delays in delivery by the NMS.
2	Shortages of some of the key drugs at the National Medical Stores leading to incomplete deliveries.
3	Insufficient funding and delays in the release of funds by the Ministry of Health
4	Lack of sufficient knowledge in drug quantification which leads to inaccurate estimates of the drug needs by the health centers.
5	Poor drug inventory management at the health facilities.
6	Lack of trained personnel in drug logistic management at the health centers.
7	Irrational use of drugs mainly due to poor prescription habits at the health facilities.
8	Theft and leakages of drugs in the drug supply chain
9	Poor staff motivation of staff at the health facilities

The above reasons for the stock outs of drugs at the public health facilities previously mentioned were the final themes that came out after the analysis of the qualitative data. Some of the quotations from the key respondents supporting some of the reasons are presented in box 2.

Box 2: Direct Quotations from Key Respondents on drug shortages at health facilities

Respondent 1 (Warehouse in-charge)
"The drugs can never be enough. People are so many and some of the fast moving drugs are used up within one week of supply"

Respondent 2 (Head of health unit)
"Those people in the National Medical Stores are not serious. When you make an order, they can only manage to supply half of the items and yet we cannot be given the funds for items not supplied"

Respondent 3 (Warehouse in-charge)
"We have so many patients and the drugs are not enough. The majority of the patients are sent to buy drugs from the private drug shops and pharmacies for most of the drugs which are out of stock"

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Respondent 4 (Head of health unit)
"The problem is National Medical stores. They take long to supply the drugs. When you make an order sometimes it takes more than two months to receive the drugs. Meanwhile we have nothing to give to the patients. We have complained and given up. Our hands are tied up there is nothing much we can do".

Respondent 5 (District Director of Health Services)
"You know very well that drugs are very expensive. They take a big share of our budget and we can only buy drugs which are within our budget. Our health units too have got their own problems. They cannot make their requisitions in time and delays the procurement process".

Respondent 6 (Ministry of health official)
"Okay, most people will say funds are not enough. But the problem is mainly lack of proper quantification of the drug requirements at the districts Remember that we still have a problem of poor drug management. One can not rule out leakages and theft of some of the drugs"

Respondent 7 (NMS official)
"I think you are aware that most of the drugs used in this country are imported and definitely you expect delays in the procurement process. But a part from that you that we are supplying drugs to all government facilities in the whole country. I know we have shortages of some drugs but I would like to assure that we are doing our best".

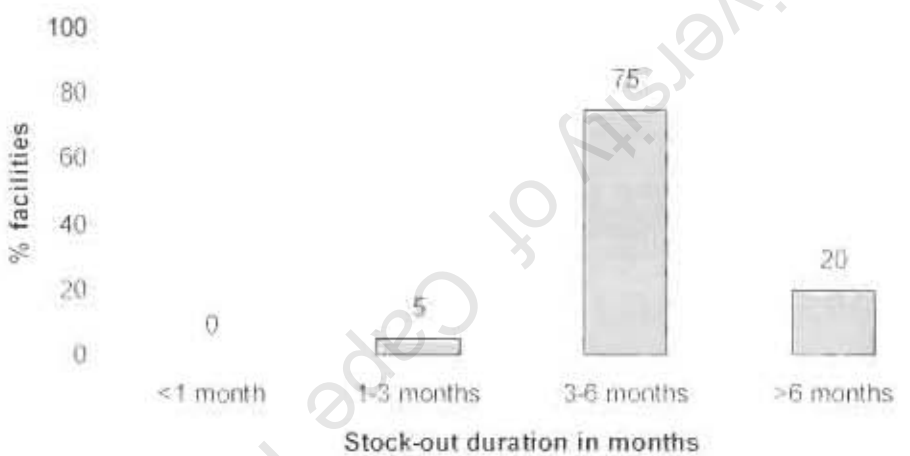
Respondent 8 (Inspector of drugs)

"The situation of drugs at these health centers would not have been all that bad. There is no proper accountability for these drugs. You know that the salaries of the health workers in these facilities are very small and they have to survive. So what do you expect?"

4.3 Stock out duration of the key drugs

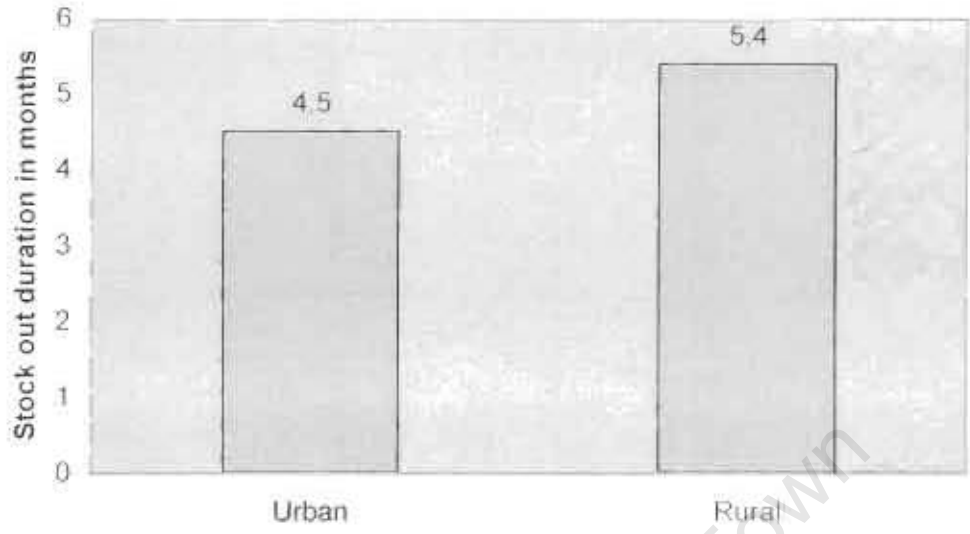
An adequate logistic system ensures that essential drugs remain in stock at all times. The results from this study show the average stock out duration of the basket of the key drugs of approximately 5 months. The median stock out duration of the key drugs was 4.55 months, while the range was from 1.9 to 8 months. Facilities with a stock out duration of more than 3 months constituted 95% of the study facilities. Figure 5 shows the results of stock out duration for covering a period of six months starting from June 1, 2005 to November 31, 2005.

Figure 5: Stock- out duration in public health facilities in Kampala and Mbale districts



A comparison of the stock out duration of the key drugs for the rural and urban health facilities was also made. The results as shown in Figure 6 indicate that the average stock out duration for rural health facilities was 5.4 months compared to 4.5 for urban health facilities.

Figure 6: Rural-urban comparison of stock out duration



An assessment of the average duration of the stock outs of the individual drugs that occurred during the six month period was also made. This gives an indication of how long the stock outs lasted. The results show that some of the drugs had a high average percentage stock out duration of the six month duration. Hydralazine injection,and Magnesium sulphate injection were out of stock for 100 percent of the six month period Paracetamol syrup 94.4%, Benzoic acid + salicylic acid ointment 92.9%, Gentamicin injection 77.8%, Methylergometrine injection 47.3%, Cotrimoxazole tablets 44.2% and Metronidazole tablets 41.4%. Table 8 shows details of the results for health centre II and III combined.

Table 8: Percentage of Days Out of Stock for the key drugs for HC II and III in Kampala and Mbale districts

Key drugs to treat common conditions	Average % Days Out of Stock
1. Amoxicillin capsules 250mg	26.8
2.Acetysalicylic acid(aspirin)tablets 300mg	3.6
3.Chloroquine tablets 150mg base	21.8
4. Cotrimoxazole tablets 480mg	44.2
5. Ferrous sulphate/folic acid tablets 200mg/400mcg	12.4
6. Mebendazole tablets 200mg	7.1
7. Metronidazole tablets 200mg	41.4
8. Retinol(vitamin A) capsule 100,000 IU	16.9
9. Sulphadoxine/pyrimethamine tablets 500/250mg	12.9
10. Benzyl penicillin injection 1g(1MU)	20.5
11. Methylergometrine injection 200mcg/ml	47.3
12. Gentamicin injection 40mg/ml	77.8
13. Hydralazine injection 20mg/ml	100.0
14. Magnesium sulphate injection 50%	100.0
15. Measles vaccine	21.4
16. Medroxyprogesterone injection 150mg/ml	34.4
17. Benzoic acid + salicylic acid ointment 6%+3%	92.9
18. Paracetamol syrup 120mg/5ml	94.4
19. Oral rehydration salts(ORS)	31.7
20. Tetracycline eye ointment 1%	10.4

Table 9 shows the average percentage duration of stock outs of the drugs for health centers IV and District hospitals. The results indicate that Magnesium sulphate injection was out of stock for 100% of the six month period, while Ceftriaxone injection, Hydralazine injection, Paracetamol syrup, Medroxyprogesterone injection, Gentamicin injection, Ketoconazole tablets, Cimetidine tablets, Quinine sulfate tablets and Ciprofloxacin tablets had an average of more than 50%. Other drugs that fared poorly are Clotrimazole cream with 44.6%, Sodium Chloride infusion 39.8% and Amoxicillin capsules 39.1%.

Table 9: Percentage of Days Out of Stock for the key drugs for HC IV and District hospitals for Kampala and Mbale districts

Key drugs in stock to treat common conditions	Average % Days Out of Stock
1. Amoxicillin capsules 250mg	39.1
2. Ciprofloxacin tablets 500mg	56.9
3. Quinine sulfate tablets 300mg	63.2
4. Cotrimoxazole tablets 480mg	11.8
5. Ketoconazole tablets 200mg	51.1
6. Mebendazole tablets 200mg	0.0
7. Metronidazole tablets 200mg	22.8
8. Lidocaine HCL injection 2%	23.4
9. Quinine DI-HCL injection 600mg/2ml	10.2
10. Ceftriaxone injection 1g	76.7
11. Methylergometrine injection 200mcg/ml	7.59
12. Gentamicin injection 40mg/ml	52.7
13. Hydralazine injection 20mg/ml	77.6
14. Magnesium sulphate injection 50%	100.0
15. Cimetidine tablets 200mg	55.8
16. Medroxyprogesterone injection 150mg/ml	61.1
17. Clotrimazole cream 1%	44.6
18. Paracetamol syrup 120mg/5ml	66.7
19. Sodium Chloride infusion 0.9%	39.8
20. Tetracycline eye ointment 1%	21.9

4.4 Average lead time from suppliers to warehouses of the health facilities

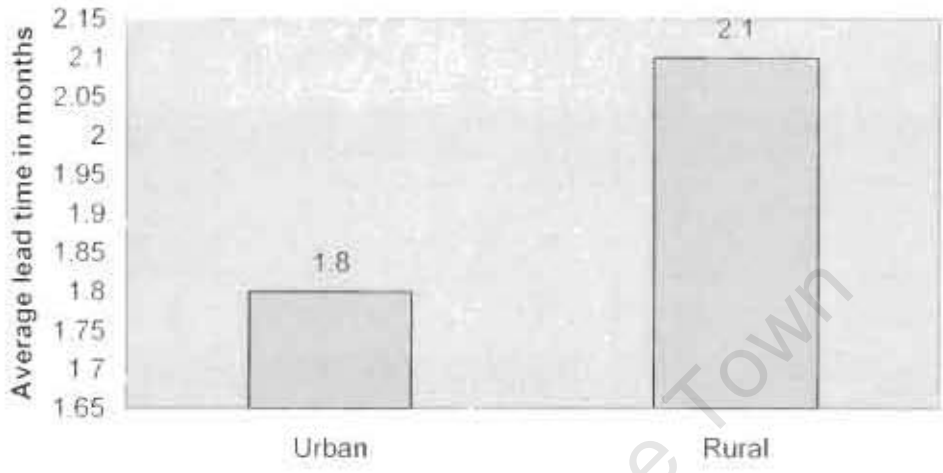
Lead time is the time between the initiation of the purchase order and receipt of the goods at the warehouse from the selected supplier. The average lead time for all the facilities was approximately 2 months. Two facilities (10%) reported lead time of half a month, 4 facilities (20%) 1 month, 10 facilities (50%) 2 months, 2 facilities (10%) 3 months and 2 facilities (10%) 4 months. Table 10 shows the lead time of different health facilities.

Table 10: Lead time in months for health facilities in Kampala and Mbale districts

Time(months)	No. of Health Facilities	% of Health Facilities
0.5	2	10
1.0	4	20
2.0	10	50
3.0	2	10
4.0	2	10

Figure 7 shows the average lead time for the urban based facilities compared to the rural based facilities.

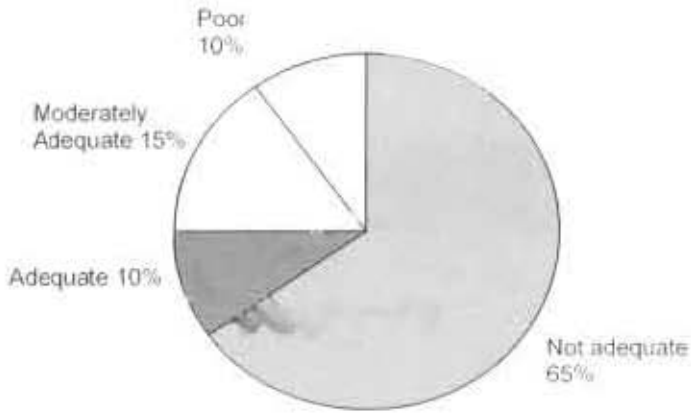
Figure 7: Rural-urban comparison of the lead time



4.5 Quality of drugs at the public health facilities

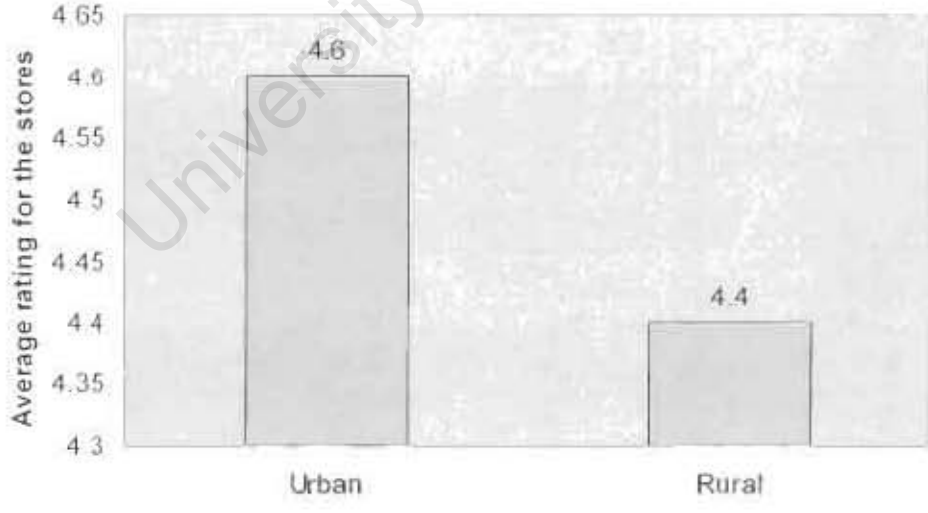
The status of essential drug storage in public health facilities was determined as an indirect measure of the quality of drugs. Inadequate storage and distribution can lead to physical deterioration and chemical decomposition, reduced potency, and occasionally, formation of toxic by-products of degradation. Adequacy of storage can be used as a proxy measure for the quality of drugs. The study revealed that the storage facilities had an average score of 4.8 out of a maximum of 11 points. Two facilities (10%) were judged as having adequate storage facilities, three (15%) moderately adequate, thirteen (65%) not adequate and two (10%) poor storage facilities. Figure 8 shows a graphical representation of the results.

Figure 8: Percentage facility by level of adequacy of storage in Kampala and Mbale districts



The adequacy of storage was also compared for the urban and rural health facilities. The results indicate that the rural facilities had average score of 4.4 compared to 4.6 for the urban facilities. Figure 9 shows details of the results.

Figure 9: Rural-urban comparison of storage adequacy



The individual storage conditions were also analyzed to extract problem areas in need of improvement. The majority of the stores did not have suitable environmental conditions for storage of drugs which include: temperature, humidity, and protection from sunlight. In

addition there were poor levels of cleanliness and tidiness levels. Figure 10 shows the percentage of compliance with each of the 11 minimum conditions for storage areas.

Figure 10: Compliance with individual storage conditions for health facilities in Kampala and Mbale districts

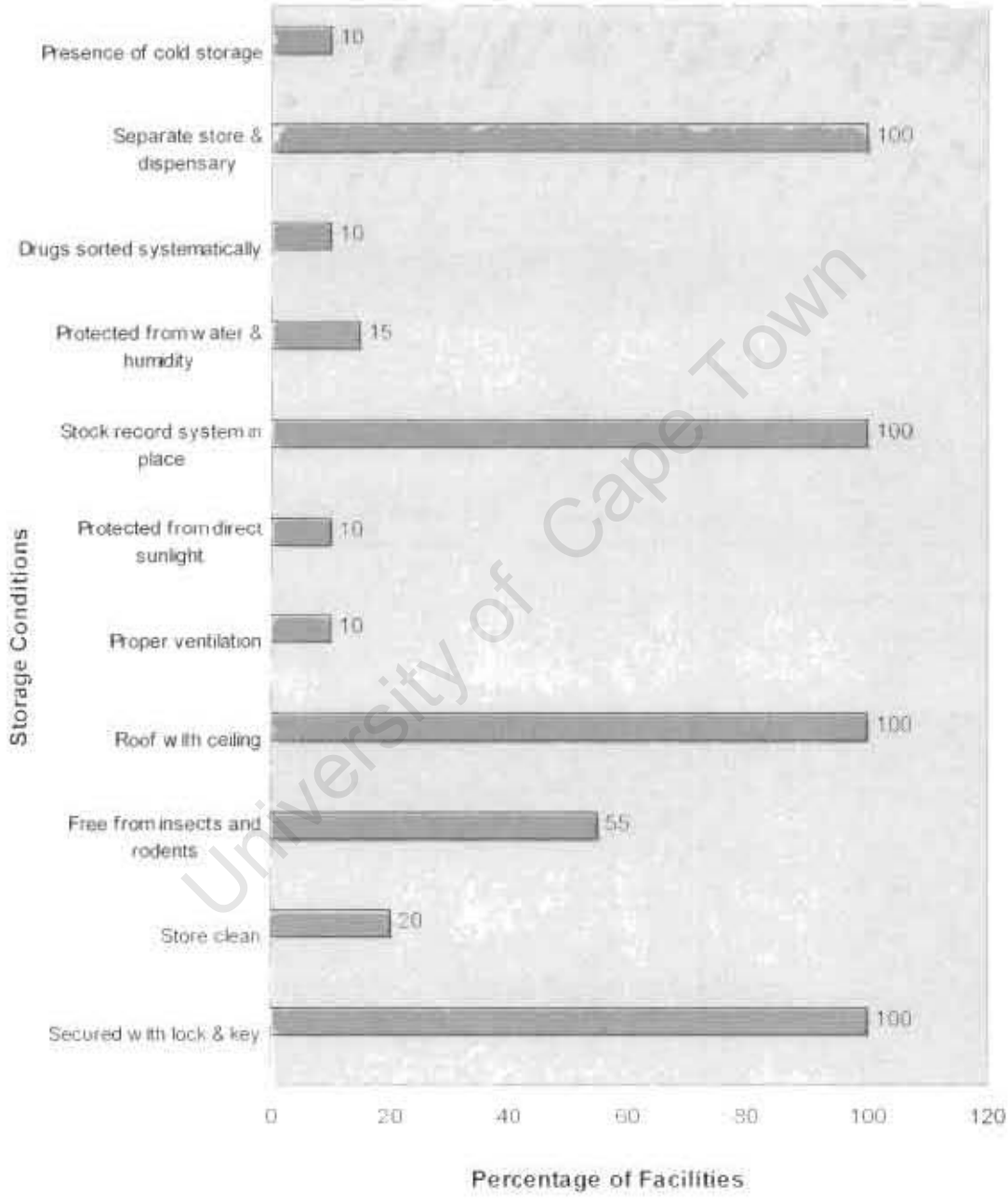
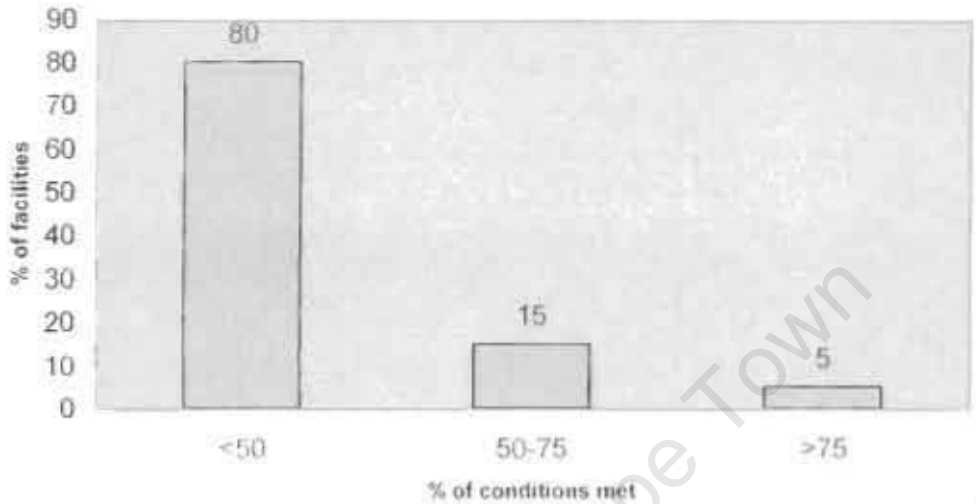


Figure 11 presents a summary of the level of compliance with the11 minimum conditions for proper storage. Overall only 5% met more than 75% of the conditions.

Figure 11: Compliance to minimum storage area



The presence of expired drugs in the shelves of the drug stores in the health facilities was another factor considered in assessing the quality of the drugs. The results of the study show that 4 facilities (20%) were found with one or more expired drugs on the shelves. The median percentage of expired drugs was 0% while the average was 2%.

4.6 Effective inventory control system

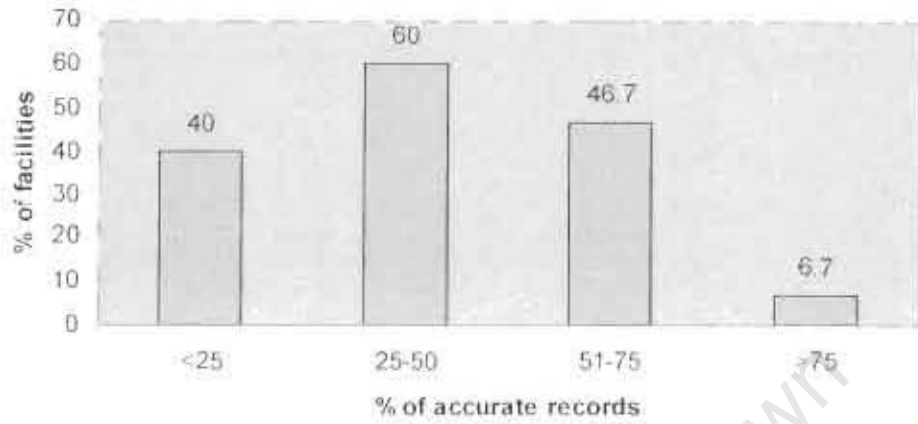
Effective stock control is a prerequisite for effective drug management at the public health facilities. The percentage of stock records that correspond with the physical count of drugs was used to measure the inventory management performance. All the health facilities surveyed had stock cards and were using them. The average number of records for all the facilities that corresponded to the physical counts at the time of the survey was 36% with a range of 0% to 80% and a median value of 36.7%. Table 11 shows details of the results.

Table 11: Percentage of records corresponding with the physical count in the health facilties in Kampala and Mbale districts

Health facility	Number of records with no discrepancy (n = 15)	% of records corresponding with physical stock count
1	11	73.3
2	9	60.0
3	11	73.3
4	5	33.3
5	7	46.7
6	6	40.0
7	3	20.0
8	7	46.7
9	4	26.7
10	12	80.0
11	4	26.7
12	0	0.0
13	0	0.0
14	3	20.0
15	0	0.0
16	4	26.7
17	7	46.7
18	0	0.0
19	6	40.0
20	9	60.0

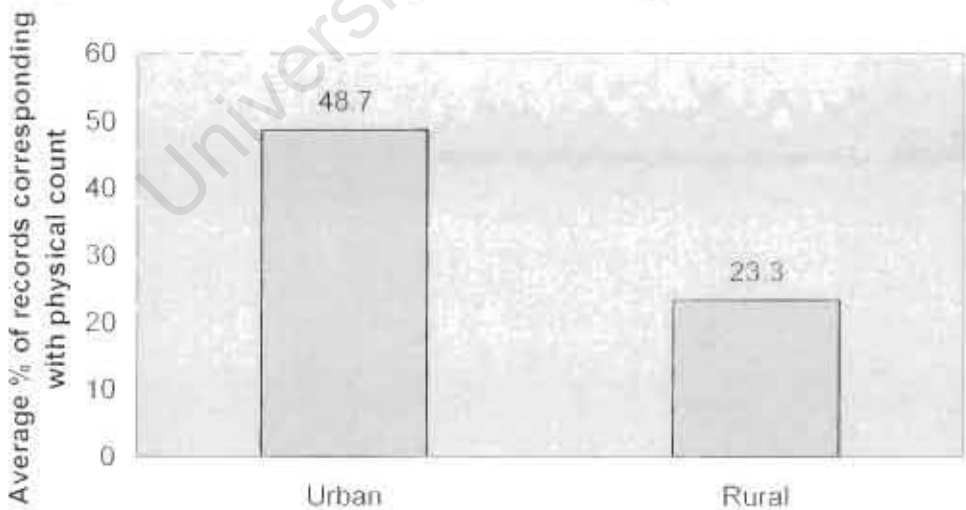
Figure 12 summarizes the performance of the health centers in terms of records that corresponded with physical counts. It is evident that only one (6.7%) health center had more than 75% of the records that corresponded with the physical count.

Figure 12: Percentage of records that correspond with physical count for health facilities in Kampala and Mbale districts



The accuracy of the records was also compared for the rural and urban health centers. The rural health facilities had an average of 23.3% records that corresponded with the physical counts compared to 48.7% for the urban health facilities. Figure 13 shows details of the results.

Figure 13: Rural-urban comparison of accuracy of the stock records



In addition, the level of training of the staff in charge of the drug stores was studied. Figure 14 describes the different training of the staff. The categories include nurses/mid-wives, pharmacy technicians, pharmacist and stores manager. There were 2 (10%) pharmacists, 1 (5%) pharmacy technician, 16 (80%) nurses/ midwives and 1 (5%) stores manager. Among them only 4 (20%) were formally trained in logistics management. The rest (80%) reported self training on the job.

Figure 14: Categories of staff training

4.7 Availability of the Essential Drug List and the Uganda Clinical Guidelines

The Essential Drug List of Uganda (EDLU) provides a reference for drugs to be used at the public health facilities while the Uganda clinical guidelines (UCG) a reference source that supports more appropriate prescribing. The Essential Drug List of Uganda was available in 10 (50%) of the health facilities and the Uganda Clinical Guidelines in 12 (60%) of the facilities. The results are presented in Figure 15.

Figure 15: Availability of the EDLU and the UCG at the health facilities in Kampala and Mbale districts

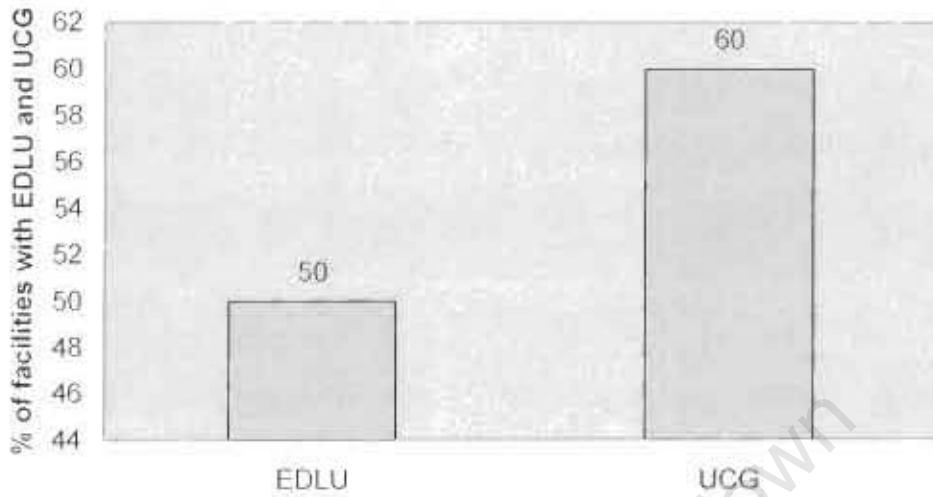


Table 12 breaks down the availability of the Essential Drug List of Uganda by facility type.

Table 12: Availability of EDL by, facility type in Kampala and Mbale districts

Type of facility	Number of facilities surveyed	Facilities with EDL	% of Facilities with EDL
District hospital	2	2	100
HC IV	4	2	50
HC III	10	6	60
HC II	4	0	0

Table 13 breaks down the availability of the Uganda Clinical Guidelines by facility type.

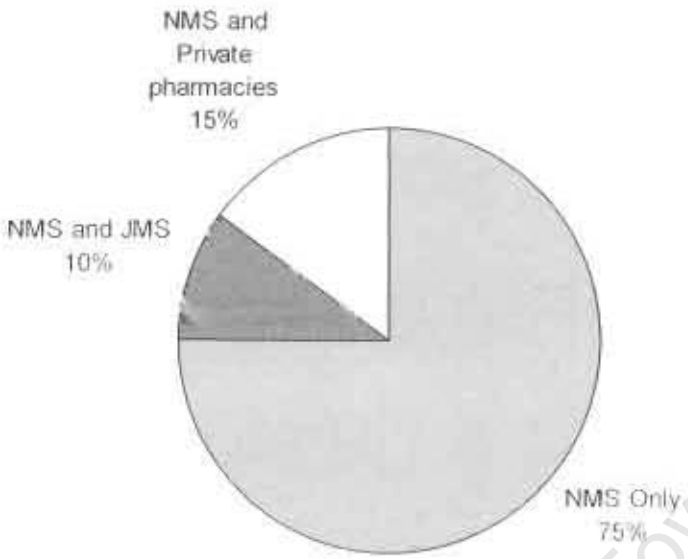
Table 13: Availability of UCG by, facility type in Kampala and Mbale districts

Type of facility	Number of facilities surveyed	Facilities with UCG	% of Facilities with UCG
District hospital	2	2	100
HC IV	4	3	75
HC III	10	5	50
HC II	4	2	50

4.8 Main suppliers of drugs

The main supplier of essential drugs to the public health facilities in Uganda is the National Medical Stores which is an autonomous drug supply agency. The public health facilities are only allowed to purchase from other sources only when the drugs are not available at the National Medical Stores. The survey results reveal that only 3 (15%) facilities had purchased drugs from private pharmacies and only 2 (10%) had purchased drugs from the Joint Medical Stores which is a religious based organization. The rest of the health facilities had only purchased from the National Medical Stores. Figure 16 shows details of the results.

Figure 16: Main Suppliers of Drugs



4.9 Summary

This chapter presented the major findings in relation to the objectives of the study. Results from the interviews reveal that drug shortages at the public health centers are mainly due to poor management. The results also indicate that most of the drug stores do not meet the minimum conditions of storage. Record keeping was generally poor in most of the health centers and the majority of the health workers were not formally trained in logistics management. The average lead time was two months and the main supplier of drugs was the NMS. The above results have significant interpretation as discussed in the next chapter.

CHAPTER 5: DISCUSSION OF STUDY FINDINGS

5.1 Introduction

In this chapter, the findings presented in chapter 4 are discussed in reference to the study objectives and the literature reviewed. The revealed level of poor drug management is discussed in relation to the used standard indicators. Qualitative results where possible have been used to make some interpretations of the quantitative results, in reference to findings from other studies.

5.2 Availability and stock out duration of the key drugs

Availability of drugs at each health facility is an important indicator of performance. Shortages or stock outs of key drugs and medical supplies discourage patients from using health facilities and can even deter them from using the health system at all (Lijdsman et al 2004). Stock availability is the ultimate measure of logistic system performance and it also gives an idea of the overall effectiveness and efficiency of the entire system, from forecasting and procurement to distribution, storage and inventory management (Ministry of Health 2003c).

The results as shown in Figure 3 (page 36) indicate an average availability of 62.5% of the key drugs with only 10% of the facilities having availability greater than 75%. This implies that patients were not able to access some of the drugs if they visited the health centre that very day. The non availability of some key essential drugs, especially at the health centre level further hampers the provision of quality services as most drugs prescribed would have to be bought by the patient from the private pharmacies, drug shops or clinics outside the health facilities most of which may not have adequate storage facilities for preserving the integrity of the drugs, or worse still they may sell expired drugs to the unsuspecting patient. In addition, the quality of the service in the private health facilities may not be guaranteed because of the profit driven motives in the private sector which is aggravated by information asymmetry between the patient and the provider. In most cases, they may not afford to buy the drugs because of the high cost.

Further more, details of the results as indicated in Table 6 (page 38) shows that benzoic acid + salicylic acid ointment, paracetamol syrup, and hydralazine injection, were not

available in any of the health centers II and III. This trend could probably be due to the non availability of these drugs at the NMS or probably due to the fact that the health centers did not consider them as a priority. In conversation with some of the health workers, it was revealed that paracetamol syrup was not a priority because of the high cost and that it could easily be substituted with tablets which are cheaper. Technically, the syrups are specifically formulated for children because of ease of administration. The non availability of such a drug is denying the clients access to the right dosage form of the drug. In addition, a drug such hydralazine injection which is a life saving drug but was not stocked at all most likely because of its rare use and high cost. Even if a drug is rarely used but vital to patient care, at least a minimum quantity should be kept in stock.

Other drugs which include oral rehydration salts, gentamicin injection, methylergometrine injection, metronidazole tablets, and cotrimoxazole tablets were not available in the majority of the health centers in comparison to the rest most probably due to their high rate of utilization, purchase of insufficient quantities because of limited resources and the inability of the health centers to make accurate quantifications of their requirements. Magnesium sulphate injection though a first line drug in the treatment of eclampsia in pregnancy was only available in one health center. This was mainly because the staff at the health centers was not familiar with this drug (Interview data).

Considering the data for HC IV and the District hospitals (see Table 7 page 39) paracetamol syrup and Magnesium sulphate injection were also not available in any of the health centers because of the reasons already mentioned. Hydralazine injection was also available in only one health center for similar reasons mentioned for the HC III and II. Other drugs with low percentage of availability include; Ciprofloxacin tablets, Quinine sulfate tablets, Lidocaine HCL injection and Ceftriaxone injection. These drugs have got a high rate of utilization and the same time costly. Because of the limited financial resources, the health centers may not be able to stock sufficient quantities.

In theory, all the key essential drugs are kept in full supply to meet the needs of all clients. As we see from the results this is not happening in practice. Each stock out that takes place represents clients who will not receive the treatment that they were seeking at the health

care facility. The availability of the drugs on the day of the visit reflects whether the facility could offer a service and the related drug to the next client (or clients) who visit a health facility. This indicator simply provides a snapshot in time and does not represent continuous availability over time. Therefore the data on stock availability at the time of survey visit must be interpreted cautiously.

An assessment of the average duration of stock outs provides a more in depth look at how long the stock outs lasted and the probability that a client who sought health care during this time period would not have received the drugs needed. This data differentiates between drugs stocked out for a short period of time versus those stocked out for a long period of time.

The average stock out duration was approximately 5 months. As indicated in Figure 5, 95% of the facilities had a stock out duration of more than 3 months. The clients could not therefore access the stock out drugs during that period. The details of the individual drugs in Table 8 for HC II and HC III indicate that Hydralazine injection and Magnesium sulphate injection were 100% out stock for the six month period. This is not surprising as these drugs performed poorly in the previous results of availability. For Hydralazine injection this could be attributed to its rare use and Magnesium sulphate for not being known as previously mentioned. The drugs Benzoic acid + salicylic acid ointment and Paracetamol syrup also performed poorly most likely because were not taken as a priority. The commonly used drugs such as Gentamicin injection, Cotrimoxazole tablets, Metronidazole tablets, Methylergometrine injection were also out stock for a quite big percentage of time for similar reasons of high utilization rates, purchase of inadequate quantities and inaccurate quantifications.

Considering the results for HC IV and District hospitals (see Table 9 page 45), Magnesium sulphate injection, Hydralazine injection, and Paracetamol syrup, showed the same trend of results as for HC II and HC III. The commonly used drugs were also out stock for big percentage of time for similar reasons of high utilization rates, inaccurate quantification or limited resources. These included; Amoxicillin capsules, Ciprofloxacin tablets,

Ketoconazole tablets, Cimetidine tablets, Ceftriaxone injection, Clotrimazole cream and Sodium Chloride infusion.

On analysis of data stratified by rural versus urban, it is noticed that the urban based facilities had more availability of drugs than the rural based health facilities. The stock out duration for the rural health facilities was also higher than that for the urban based facilities. However, the performance for both the rural and urban health facilities is still much below the required standards. The slightly better performance of the urban facilities may be attributed to better geographical access of the urban rural centers. Better infrastructure in the urban area makes it easy to access the health centers. Further more, the urban health centers may be under closer supervision compared to the rural health facilities.

5.3 Average Lead time

According to the drug logistic system in Uganda, the public health facilities are supposed order drugs every two months. The orders are first approved by the HSD before being sent to the districts for final approval. The orders are then sent to the NMS which is supposed to distribute to the districts every two months. The districts are then responsible for delivering the appropriate commodities to each of the health sub-districts. Each facility then collects their commodities from the health sub-districts (Ministry of Health 2003c).

Timely distribution of the correct quantities of dugs is critical for ensuring a continuous supply. The results in Table 10 indicate an average lead time of approximately 2 months with 20% of the facilities having a lead time of more than 2 months. According to MSH (1997), most public programmes use an interval of one to three months. The average lead time of approximately 2 months is within the acceptable limits provided that the supplied drugs last up to the next delivery. The rampant stock outs as already observed could be partly due to the supply of insufficient drugs which cannot last up to the next delivery cycle. There should be safety stock (buffer or minimum stock) kept on hand to avoid stock outs. The stock outs can occur because of delays in delivery or if there is unexpected increase in demand.

The delayed deliveries observed for some health centers, could be attributed to delays in the processing of the orders by the NMS and late deliveries to the districts. In the same

way, the districts may delay the deliveries to the individual health centers. The NMS is supposed to deliver products to all the districts of Uganda. This is an enormous task which requires a high level of organization and an efficient transport system. The inefficiencies in the distribution and transportation cannot be ruled out. Poor infrastructure and road conditions and shortages in funding for fuel or other means of transportation often make transportation difficult. The NMS has no regional warehouses and all the commodities have to originate from the central stores making the distribution more inefficient. The average lead time of the rural health centers was slightly more compared to the urban centers most likely because of the longer distance from the NMS and the poor road infrastructure which is characteristic of rural areas in developing countries.

5.4 Causes of drugs shortages as spelt out in the qualitative data

The qualitative data from the key respondents may be used to explain some of the causes of stock outs of drugs at the health facilities. Among the reasons cited were the poor drug funding. Drug financing is linked to availability of drugs and availability of drugs depends among many factors on sufficient funding sources and is a key indicator towards determining access to drugs by the population. There five major sources of drug financing within the Uganda health sector that contribute to the total funding pool for drugs. These include: Uganda government, donors, employers, non-governmental organizations and households (Ministry of Health 2002d). The total drug financial resource estimate increased from 125 billion Uganda shillings (2001/02) to 210 billion Uganda shillings (2003/04) excluding funds from Global Fund, registering an increase of 23 percent per annum over the three year period (Ministry of Health 2004b). According to the Annual Health Sector Performance of the Ministry of Health (2003), the per capita funding of drugs for the National Minimum Health Care Package (NMHCP) increased from US$0.86 in the financial year 2001/02 to US$1.2 in financial year 2002/03 but there continued to be a large gap compared with the projected requirements of US$ 3.5 (excluding ARVs and pentavalent vaccine). For the financial year 2005/06 the estimated per capita medicine inputs are projected to be over US$4 because of the commitments for a new first line treatment of malaria with artemisinin based combination therapy (ACT) to be funded through the Global Fund for AIDS, TB and Malaria (GFATM). This amounts to an additional US$1 per capita annually, which is larger than the entire monetary medicines

budget for service providers (Ministry of Health 2004). This shows that the funding gap continues to increase with the introduction of the new and expensive medicines. The current level of funding is not able to meet the target set out in the National Minimum Health Care Package. Inadequate drug financing therefore remains a major hindrance to providing sufficient drugs to the public sector. Therefore the problem of drug financing as pointed out by the respondents is not a surprise but it is consistent with what has already been established by the Ministry of Health. Given this large financing gap there is need to devise ways of improving the available financing and also determine the most effective ways of financing the package.

Drug financing is inevitably linked to drug supply systems and therefore improvements in terms of efficiency of the delivery systems can make a significant impact on the utilization of the resources available. The stock outs were also attributed to the inefficiencies of the health units in the requisition of drugs by the health centers and the inefficiencies of the NMS in the procurement and distribution of drugs (interview data).

According to the Annual Health Sector Performance of the Ministry of Health (2005a), routine monitoring highlighted irregular drug procurement and below target expenditure on drugs compared to the indicative cash budget. Contrary to the Primary Health Care Conditional Grant (PHC-CG) guidelines, medicines expenditure falls far below 50%. Funds through credit line have shown better efficient utilization than those through recurrent transfers with average 90% utilization. Under spending may be related to re-allocation of funds, irregular ordering, and /or sub-optimal service at NMS. The Technical Review report also reveals that NMS sales have stagnated because it is unable to procure sufficient stocks and that performance is hindered by constraints, including lack of financial capital, changing regulations for procurement and longer lead times under the Public Procurement and Disposal of Assets Act (PPDA), and limited planning and management capacity. Service level (% of order of value actually supplied) deteriorated to 50% by June 2005, compared with performance in the range of 66-75% during the period July 2003 to December 2004 (Ministry of Health 2005a). Therefore the low availability and long periods of stock outs should not be a surprise given this scenario.

The above scenario clearly indicates that even the little available resources were not fully utilized. Full and efficient utilization of the available funds would definitely improve the availability of the drugs at health centers. The unutilized funds of the credit line which get tied up with the NMS plus the under utilized funds of PHC Conditional Grants would make definitely make a difference if they were fully utilized. Increasing drug financing without improving the efficiency of the drug supply system cannot improve the availability of drugs at the health centers.

According to Bennet et al (1997), the failure of government supply systems to provide adequate and efficient services is often seen to be symptomatic of fundamental problems in the public sector including:

- Public sector rigidities, particularly bureaucratic staff regulations
- Lack of incentives for efficient behavior
- Political interference
- Lack of management autonomy, responsibility and accountability
- Absence of competition and
- Inadequate financial resources

Drug supply systems need to achieve three main objectives which include: a high level of service, as measured by low rates of shortages and stock outs; efficiency, as measured by having low total costs for a given level of service and quality in terms of delivering drugs of satisfactory quality (Bennet et al 1997). In recent years, a variety of attempts have been made to introduce private sector management methods and elements of competition into public sector services in developed as well as developing countries (Bennet et al 1994, Bennet 1991). These attempts were based on the belief that the key issue was not public ownership, but rather the nature of management and the market environment within which the organization operates. In Uganda, the debate is still going on whether the NMS should be privatized or not.

5.5 Quality of drugs at the public health facilities

All health commodities require specific procedures and conditions for safe storage that protect their integrity and effectiveness, maximize their shelf life, and make them readily available for distribution. When all levels of the system follow the same standards of storage, clients can be assured that they will receive a high-quality product. Because commodities are stored and transported from one level of system to another, all levels of storage within the logistics system must comply with a set of minimum standards to protect the commodities until they are distributed to a client at a service delivery point (MSH 1997, Ministry of Health 2003c)

All the pharmaceuticals marketed in Uganda must be registered with the National Drug Authority (NDA). The drugs must be from pharmaceutical plants which have been inspected and approved by the National Drug Authority. The NDA is also required by law to inspect all the pharmaceutical products imported in the country. Physical inspection of all medicines is carried out at the port of entry and samples are selected from each batch and tested if a problem is identified during physical inspection. With all the quality assurance procedures followed as mentioned, it is expected that all drugs imported in the country should meet the minimum required standards (Ministry of Health 2002b). However, as already mentioned, the quality of the drugs cannot be maintained unless they are properly stored.

As indicated in Figure 8 (page47) only 10% of the health centers had adequate storage facilities. This should be a cause of concern because the quality of drugs in the majority of health centers may not be guaranteed because of the inadequate storage conditions. According to MSH (1997), a drug product must retain its properties within specified limits in order to be useful. The stability of a drug product depends on the active ingredient, which can be affected by its formulation and packaging. Inadequate storage and distribution can lead to physical deterioration and chemical decomposition, reduced potency, and, occasionally, formation of toxic by-products of degradation. This is more likely to occur under tropical conditions of high ambient temperature and humidity (MSH 1997). The unsuitable storage conditions leads to premature expiry of drugs rendering them unsuitable for clinical use.

The comparison of the rural and urban based storage facilities as indicated in Figure 9 (page 47) shows that the average ratings for both are below the acceptable standards. The inadequate storage conditions as indicated in Figure 10 (page 48) were mainly attributed to poor design of the stores leading to high temperatures, poor ventilation, direct sunlight and poor drainage systems. Storage should be located in a dry weather proof building. Stocks should be organized and easily accessible on adequate good shelving. Space and cold chain equipment should be provided for the refrigeration of vaccines and other items. Because of inadequate shelving and lack of pallets drugs meant that drugs would be placed on the floor where they are not protected from humidity. Only 10% the facilities had cold storage facilities and only 15% had drugs protected from humidity and water. In addition a poor level of cleanliness, tidiness of stocks and storage rooms which is associated with presence of insects and rodents was also observed in the majority of the stores. The insects and rodents destroy the stores and the stocks as well. Figure 11 (page49) shows that only 5% of the facilities complied with more than 75% of the storage conditions. There is an urgent need to improve the physical storage capacity at the health facility level.

The presence of expired drugs on the shelves was also used as a proxy measure for the quality of drug at the health centers. Expired products can no longer be offered to clients. But when they found on the shelves mixed with the non-expired ones, there are high chances of being dispensed. The use of poor quality products may have undesirable clinical and economic effects, as well as affect the credibility of the health delivery system. Clinical effects can include prolonged illness or death or inducement of toxic or adverse reactions. On the economic side, limited financial resources may be wasted. The average percentage of expired drugs was 2% and they were only found in only 4% of the facilities. When the drugs expire, they should be immediately removed and securely stored in a separate area. Presence of expired drugs on the shelves is also a sign of poor stores management. The low product loss due to expiration was low most likely because of the short supply of drugs which were consumed before expiration.

Drugs usually expire because they have been over ordered, or if the FEFO (first to expire, first out) has not been observed. In well run stores where orders are placed regularly and stock is rotated this should not happen. Most health care systems in developing countries

operate with limited funding; health commodities are precious and rarely in full supply. Therefore, losses of otherwise usable commodities due to expiration should be avoided at all costs.

Reviewing the quantities of expired stock provides another measure of overall logistic system performance, though it will not highlight the causes or the components for any deficiencies in any logistic system. Some amount of commodity loss due to expiration is expected in any logistic system, but large quantities should be investigated (Ministry of Health 2003c).

5.6 Inventory control system

The primary purpose of a store is to receive, hold, and distribute stock. This process is controlled by an inventory control system, which may be manual or computer based. The primary purpose of inventory control is to manage procurement and stock movements. The system should also be designed to provide information for performance monitoring.

The survey on a positive note revealed all the facilities were using stock cards. The survey collected data regarding the accuracy of the logistics at the facility level. The average number of records that corresponded with physical count as indicated in Table 11 (page 50) was 36% and only 6.7% of the facilities had more than 75% of the records corresponding with the physical count (see Figure 12 page 51). The rural-urban comparison of the accuracy of the stock records shows poor a performance far much below standard for both although the urban health facilities scored higher. Low percentages of correspondence between stock records and physical counts may be caused by wastage or pilferage and highlights problems of accountability, all of which contribute to financial losses. This poor performance in record keeping and lack of proper accountability was not a surprise because it had been earlier pointed out by the key respondents during the interviews as one of the major causes of drug shortages at the health facilities.

The pilferage of the drugs is possible in developing countries where health workers are poorly paid and they resort to using the public resources as a survival mechanism. According to Birungi (1994) the public health workers in Uganda tried to survive within and/or outside the system by creating institutional linkages between public and private

settings and many kept their jobs for reasons of access to public resources to use in the private sector (Birungi 1994). The NMS supplies drugs to the public sector as well as the private sector. The drugs supplied to the public sector are not specifically marked to differentiate them from those supplied to the private sector. This makes the pilferage and theft of drugs from the health centers easier as they can be easily sold in the private clinics, pharmacies and drug shops without being noticed.

The poor record keeping observed was also mainly attributed to inadequate training of the staff in the drug logistic management. The survey revealed that the majority of the staff (80%) was in the category of nurse/midwife and this was as expected for the lower levels of health care. The poor record keeping was not a surprise because it is consistent with the poor training as revealed in the study results indicating that only 20% of the staff was formally trained in logistic management. Another major concern expressed by the participants, was shortage of staff and consequent overload of staff with clinical work and little dedication to record keeping.

The personnel responsible for managing health commodities need to be trained in how to maintain stock cards, how to calculate order quantities and place orders, and how to fill out records and reports. These activities, when performed accurately, help to ensure proper stock management and to give an accurate picture of consumption rates and stock on hand at each facility. Without well-trained staff, facilities run the risk of poor record keeping and inaccurate ordering, which in turn can lead to stock outs, overstocks, and expired products. The lack of training in drug logistic management and the inadequate knowledge in drug quantification were pointed out by the key informants in interviews and are consistent with what found out during the survey.

5.7 Availability of the Essential Drug List of Uganda (EDLU) and the Uganda Clinical Guidelines (UCG)

The national essential drug list and the national standard treatment guidelines should be available at all the health facilities. The essential drug list assists in the selection of a limited number of drugs to be used at each health facility. The standard treatment guidelines are used to indicate systematically developed statements to help practitioners or prescribers make decisions about appropriate treatments for specific clinical conditions.

Together with the national list of essential drugs, treatment guidelines are powerful tools to promote the rational use of drugs. They offer an opportunity to ensure that the training of health workers is based on logical approach to treatment and on a consensus about the selection of essential drugs (MSH 1997).

The availability of the EDLU and the UCG at the health facilities was surprisingly found to be low. The availability of the EDLU and UCG depends whether the Ministry of Health has enough resources to print adequate copies for distribution to all health facilities and on the ability of the staff to maintain them at the health facilities. The availability of these guidelines is used to measure the level of access of information necessary for effective drug management. There is need for the government to effectively distribute EDLU and the UCG to all government health facilities.

5.8 Main suppliers of drugs

Procurement of medicines is a specialized area that requires technical specifications to be met in addition to value for money considerations. For these reasons, the Ministry of Health guidelines require that government institutions first source their requirements from the NMS, use JMS as second option if NMS cannot supply, and buy from the private sector only as a last resort (Ministry of Health 2004).

The results as indicated in Figure 16 (page 55) revealed that 25% of the facilities had purchased drugs from other sources in addition to NMS. There was generally high compliance with the guidelines but this was at the disadvantage of the clients because the NMS was unable to supply all the drugs because of the rampant stock outs. The majority of the health facilities were not able to buy from other sources most likely because of the reluctance of NMS in giving certificates of non-availability. The funds for the unavailable drugs remain tied up at NMS and the patients are denied access to essential drugs. More flexibility should be allowed so that the health centers can purchase from other sources if the drugs are not available at NMS but at the same time there has to be close monitoring to ensure that only good quality drugs are purchased at the appropriate prices thus guarantying value for money.

5.9 Limitations of the study

Due to limited resources and time, the study included only 20 health facilities from two regions. Uganda has four regions with a lot of diversity in terms of social, political and economic development. Therefore, the findings from this study may not necessarily be generalizable for the whole country. In addition, the rampant poor record keeping experienced in almost all the health facilities surveyed made it difficult to collect very accurate data and this might have introduced unnecessary errors.

In order to put pharmaceutical indicators in context, additional information about the local situation may be required. The indicators cannot stand alone; they have to be used in conjunction with other social and health indicators. However, indicator based studies are cost-effective tools that measure complex systems in relatively short time and give investigators a snapshot to overall trends in the sector.

However, despite these limitations, the study offers significant insights into the weaknesses of drug management in the public sector in Uganda. In this regard therefore, the study is of importance to policy makers.

CHAPTER 6: CONCLUSION AND POLICY RECOMMENDATIONS

6.1 Introduction

The study gave an overview of drug management at public health facilities in Uganda. The study highlights some challenges in the pharmaceutical management system in Uganda and shows need for improvement in all areas of the pharmaceutical management cycle. This section presents the main conclusions of the study based on the study objectives. The section also points out a number of policy recommendations to improve the drug management in the public sector in Uganda. This addresses the last study objective.

6.2 Main study conclusions

The study revealed that the availability of essential drugs in the public sector is inconsistent and insufficient. There was also a high stock out duration of the drugs. This has got a negative implication on the health care delivery in the public sector as it this leads to inadequate access to essential drugs by the majority of the poor who mainly use the public sector health care facilities.

The majority of the storage facilities at the health facilities do not meet the minimum requirements for the storage of drugs. The quality of drugs stored in such facilities is not guaranteed as they are likely to expire prematurely. Such drugs are not fit for clinical use because they can do more harm than good to the patients. The presence of expired drugs in the stores was minimal because of the short supply and high utilization rates.

The study further reveals that the rampant stock out of drugs at the health facilities was mainly due to inadequate funding by the government. However, the limited resources that are available are not fully utilized because of the inefficiencies by the NMS the main supplier of drugs to the public sector and the poor planning at the health facility and district level.

Health commodity security is additionally threatened by inadequate record keeping and information systems. Substantial errors and omissions exist in recording stock data making it difficult to get accurate information which is necessary for making informed decisions. Regular reporting of this information is critical for making logistics decisions at each level

of the supply chain. Access to this data at all levels of the logistics system will increase product availability by improving the system's efficiency.

Additionally, the poor drug management is attributed to inadequate human resources for health. The study highlighted the lack of training and inadequate skills in commodity management among the staff. Lack of capacity to adequately quantify drug requirements and to manage their inventory was reported as one of the major causes drug shortages at the health facilities.

The NMS through its mandate is responsible for ensuring continuous distribution of pharmaceutical products in a financially and viable manner. Being an autonomous centralized drug supplier it enjoys government support. With a big financial base, it should be able to offer widest range of essential and vital drugs at one shopping centre. With bulk procurements it should be able to negotiate high discounts so as to offer affordable prices to the end-user. In addition the bulk operations ensure serving the remote areas markets with limited commercial appeal cost-effectively). However, the NMS has not exploited these advantages to operate efficiently. The rampant shortages of drugs in the public sector facilities has been mainly attributed to the rampant stock out at NMS, delays in processing customer orders and an inefficient distribution system.

6.3 Policy Recommendations

Based on the study findings, recommendations on ways of improving drug management at the public health facilities are developed. The study has revealed a number of issues regarding the drug management in the public health sector. The weaknesses observed should be addressed in order to improve drug management which will also translate into better availability and access to essential dugs by the majority of the population. The following below are suggestions for policy consideration.

1. There is need for the government to commit more funds in order to meet the drug requirements within the National Minimum Health Care Package. Concrete measures should be put in place to ensure that the available resources are fully utilized in the most efficient manner to provide the key essential drugs in public sector.

2. In addition there is need to improve the storage conditions of the drug stores at the public health facilities so as to meet the minimum requirements for the storage of drugs. This is necessary for avoiding the deterioration of the drugs so that the quality of drugs is maintained up to the use.

3. Further more there is need to improve inventory management by closer monitoring from the district and at national level. The National Drug Authority through its mandate should carry out regular inspections of the public health facilities and put more emphasis on proper record keeping and accountability. More training of staff in record keeping and drug quantification is necessary if accurate data is to be generated. If possible, computerized inventory control systems should be gradually introduced at the high levels of the health care systems.

4. Also measures to reduce illegal practices at the distribution stage should be put in place. These include improvements in record keeping and control procedures and fortifying against any drug pilferages at any at any stage in the drug distribution channel. The introduction of special packaging to facilitate easy identification for all the drugs intended for use in the public sector can also minimize leakages of drugs from the public health facilities. Transparency and accountability should be promoted.

5. There is need to determine what systems offer the best incentives for providers to behave honestly and control fraud. There is need to improve staff motivation. Both financial and material incentives provided for health workers by government are woefully inadequate to boost the morale of the perpetually overworked health staff. Further more, staff specifically trained in drug logistic management should be gradually recruited to be in charge of the drug stores. Preferably at lower levers of health care, pharmacy technicians with additional training in drug management should be recruited and at hospital level, pharmacists should be employed.

6. The efficiency of the NMS can be improved by contracting out of some the activities. Transportation and distribution of drugs could be contracted out to the private sector so that the NMS concentrates on the procurement as its core activity.

Regional warehouses should be established so as to reduce the lead times and to cut the transport costs. In addition, the NMS should be swifter in issuing certificates of non-availability to clients for the products which are not available.

7. Alternatively the government should look into the possibility of breaking NMS monopoly. This can be done by giving liberty to the districts to choose between NMS and JMS as the main supplier of drugs. According to the Ministry of Health Annual Health Sector Performance Report (2005a) JMS has proved to be very efficient in supplying drugs to Private Not for Profit (PNFP) health units and has for many years been a supplier to government health facilities in the area of medical equipment and instruments. Additionally, JMS has been impressive in managing change, and sustaining growth of a well diversified customer base fully using its own resources, and the flexibility in financial and procurement procedures of PNFP institution (Ministry of Health 2005a). Breaking the monopoly of the NMS could perhaps create competition and improve its efficiency.

6.4 Agenda for future research

The study identified some information gaps that would be of interest for further research and guiding future policies. Future research into the role and performance of the private sector should be carried out to get an overall picture of the situation in the pharmaceutical sector.

There is need to assess the level of utilization of the drugs at health center level in relation with what is supplied from the central level. This can give a clear picture of the value of drugs that are actually used in relation to what is supplied from the central level. In addition, this can give an indication of what is lost in the drug distribution chain.

Future research into the possibility of controlling drug prices especially in the private sector is very crucial where the cost of drugs serves as a barrier to access and to rational drug use. There is need to investigate hidden costs of drugs in the supply chain and determine at which points to intervene and reduce the costs of drugs to the patients.

There is need to explore other approaches for organizing drug supply for government health services. The possibility of full privatization of NMS should be explored especially the impact on availability and access to drugs by the poor.

Further more, exploration of the role of health insurance in improving access to drugs including provider payment mechanisms would enable investigation of possible ways of pooling resources and sharing costs over different population groups.

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APPENDIX A: AVAILABILITY OF DRUGS AT HEALTH CENTRES II AND III

(INDICATOR: % OF EXPIRED DRUGS, AVAILABILTY OF KEY DRUGS)

Survey Form No. 1

FACILITY _____ **DATE**_____

LOCATION _____ **RESEARCHER**_____

Key drugs in stock to treat common conditions[A]	In stock[B] Yes=1,No=0	Drugs in stock that have expired[C] Yes=1,No=0
1. Amoxicillin capsules 250mg		
2.Acetysalicylic acid(aspirin)tablets 300mg		
3.Chloroquine tablets 150mg base		
4. Cotrimoxazole tablets 480mg		
5. Ferrous sulphate/folic acid tablets 200mg/400mcg		
6. Mebendazole tablets 200mg		
7. Metronidazole tablets 200mg		
8. Retinol(vitamin A) capsule 100,000 IU		
9. Sulphadoxine/pyrimethamine tablets 500/250mg		
10. Benzyl penicillin injection 1g(1MU)		
11. Methylergometrine injection 200mcg/ml		
12. Gentamicin injection 40mg/ml		
13. Hydralazine injection 20mg/ml		
14. Magnesium sulphate injection 50%		
15. Measles vaccine		
16. Medroxyprogesterone injection 150mg/ml		
17. Benzoic acid + salicylic acid ointment 6%+3%		
18. Paracetamol syrup 120mg/5ml		
19. Oral rehydration salts(ORS)		
20. Tetracycline eye ointment 1%		
Total no. of drugs in [D]=	[G]=	[H]=
%key drugs in stock[E]=		
% of drugs expired[F]=		

Notes:

[A] List of 20 key drugs previously identified at a national level must be printed before starting the survey. Add the total number of key drugs [D]

[B] Mark 1 if stock is available (even if only one dosage form is available). Mark 0 if the drug is not physically available. Add the total at the bottom [G]

[E] % of key drugs in stock = $\frac{\text{No. of key drugs in stock [G]}}{\text{Total number of key drugs [D]}} \times 100$

[C] For all drugs in stock, check if expired or not. If any of the strengths has an expiry problem, the answer for the drug should be yes. Add all these answers = [H]

[F] %`of expired drugs = $\frac{\text{Total no. of yes answers[H]}}{\text{Total no. of key drugs [D]}} \times 100$

APPENDIX B: AVAILABILITY OF DRUGS AT HEALTH CENTRE IV AND DISTICT HOSPITALS

(INDICATOR: % OF EXPIRED DRUGS, AVAILABILTY OF KEY DRUGS)

Survey Form No. 2

FACILITY _____ **DATE** _____

LOCATION _____ **RESEARCHER** _____

Key drugs in stock to treat common conditions[A]	In stock[B] Yes=1,No=0	Drugs in stock that have expired[C] Yes=1,No=0
1. Amoxicillin capsules 250mg		
2. Ciprofloxacin tablets 500mg		
3. Quinine sulfate tablets 300mg		
4. Cotrimoxazole tablets 480mg		
5. Ketoconazole tablets 200mg		
6. Mebendazole tablets 200mg		
7. Metronidazole tablets 200mg		
8. Lidocaine HCL injection 2%		
9. Quinine DI-HCL injection 600mg/2ml		
10. Ceftriaxone injection 1g		
11. Methylergometrine injection 200mcg/ml		
12. Gentamicin injection 40mg/ml		
13. Hydralazine injection 20mg/ml		
14. Magnesium sulphate injection 50%		
15. Cimetidine tablets 200mg		
16. Medroxyprogesterone injection 150mg/ml		
17. Clotrimazole cream 1%		
18. Paracetamol syrup 120mg/5ml		
19. Sodium Chloride infusion 0.9%		
20. Tetracycline eye ointment 1%		
Total no. of drugs in [D]=	[G]=	[H]=
%key drugs in stock[E]=		
% of drugs expired[F]=		

Notes:

[A] List of 20 key drugs previously identified at a national level must be printed before starting the survey. Add the total number of key drugs [D]

[B] Mark 1 if stock is available (even if only one dosage form is available). Mark 0 if the drug is not physically available. Add the total at the bottom [G]

[E] % of key drugs in stock = $\frac{\text{No. of key drugs in stock [G]}}{\text{Total number of key drugs [D]}} \times 100$

[C] For all drugs in stock, check if expired or not. If any of the strengths has an expiry problem, the answer for the drug should be yes. Add all these answers = [H]

[F] %`of expired drugs = $\frac{\text{Total no. of yes answers[H]}}{\text{Total no. of key drugs [D]}} \times 100$

APPENDIX C: INTERVIEW GUIDE FOR HEALTH FACILITY OFFICIALS

Survey form no. 3

Name of facility:	**Level:**	**Location:**	**Date of interview:**
Name of interviewee:	Position:	Profession:	Other qualifications:
1. Do you have a copy of the Essential Drug List Uganda and the Uganda Clinical Guidelines?(Only the copies seen are counted)			
2. Do you always experience shortages of essential drugs at this health facility?			
3. (If YES to 1 above), in your opinion, what are the major causes of these shortages?			
4. Are their specific drugs that are frequently out of stock?			
5. Do you receive your drug supplies from the NMS in time? What are other suppliers apart from the NMS?			
6. What is the approximate time of delivery of drugs after making a requisition from the NMS?			
7. How do rate the performance of NMS in the purchase and distribution of essential drugs to health facilities?			
8. Are there any other problems related to drug management at the health facility?			
9. In your opinion, what can be done to improve the availability of drugs at the health centers?			
10. Can you suggest ways of improving drug management at this facility?			
11. Is there any staff member in this facility that has been trained in drug logistic management?			

Thank you for your time

APPENDIX D: KEY INFORMANT INTERVIEW GUIDE

Survey form no. 4

Name of facility:	**Level:**	**Location:**	**Date of interview:**
Name of interviewee:	Position:	Profession:	Other qualifications:

1. The NMS is the main supplier of drugs to public health facilities in Uganda. What have been the major challenges in the procurement and distribution of drugs in the country?
2. Frequent stocks out of drugs at the NMS and the health facilities have been reported. Can you explain the causes?
3. Delays in delays in the drugs to health facilities have been reported. If true what are the causes?
4. W hat is being done to improve the drug management at the public health facilities?
5. Can you suggest ways of improving availability of essential drugs at the health facilities?
6. Can you suggest ways of improving the efficiency of NMS ?

Thank you for your time

APPENDIX E: STORAGE CHECKLIST

APLICABLE TO ALL WAREHOUSES AND PHARMACIES

(INDICATOR: ADQUATE STORAGE)

Survey Form No. 5

FACILITY _____ **DATE** _____

LOCATION _____ **RESEARCHER**_____

Checklist	Storage	Pharmacy
	(Y = yes X = no)	
Are there locks which are working in the storage facility		
Storage and shelves area are clean(no dust or litter)		
No evidence of pests seen in the area		
There is a ceiling		
There is proper ventilation		
No direct sunlight should enter the area		
There is a stock record system		
Area free from moisture(leaking drains and taps) Drugs should not be stored directly on the floor		
Drugs sorted in a systematic way(alphabetical, first expiry-first out		
There is a separate storage and dispensing area for issuing drugs		
There is cold storage with a temperature chart		
Rating for the facility :{ [A] + [B]}/2. If only one exists just use [A] or [B] Rating =_____	**[A]**	**[B]**

SCORES

Facility storage	Rating(check)	Equivalent rating for quality of drugs
• Poor	0-3 □	Quality may be poor
• Not adequate	4-5 □	Quality may be doubtful
• Moderately adequate	6-7 □	Acceptable quality
• Adequate	8-10 □	Acceptable quality
• More than adequate	11 □	Good quality

APPENDIX F: STOCK OUT DURATION I

APPLICABLE TO HEALTH CENTRE II AND HEALTH CENTRE III

(INDICATOR: STOCK OUT DURATION)

Survey Form No. 6

FACILITY _____ **DATE**_____

LOCATION _____ **RESEARCHER**_____

Key drugs in stock to treat common conditions[A]	No. of days out of stock[B]	No. of days covered by review[C]	Equiv. No. of days/year [D]=[B]x 365/[C]
1. Amoxicillin capsules 250mg			
2.Acetysalicylic acid(aspirin)tablets 300mg			
3.Chloroquine tablets 150mg base			
4. Cotrimoxazole tablets 480mg			
5. Ferrous sulphate/folic acid tablets 200mg/400mcg			
6. Mebendazole tablets 200mg			
7. Metronidazole tablets 200mg			
8. Retinol(vitamin A) capsule 100,000 IU			
9. Sulphadoxine/pyrimethamine tablets 500/250mg			
10. Benzyl penicillin injection 1g(1MU)			
11. Methylergometrine injection 200mcg/ml			
12. Gentamicin injection 40mg/ml			
13. Hydralazine injection 20mg/ml			
14. Magnesium sulphate injection 50%			
15. Measles vaccine			
16. Medroxyprogesterone injection 150mg/ml			
17. Benzoic acid + salicylic acid ointment 6%+3%			
18. Paracetamol syrup 120mg/5ml			
19. Oral rehydration salts(ORS)			
20. Tetracycline eye ointment 1%			
[E]= Total No. of key drugs = (sum of A) = ___ [G]= Ave. no. of stock out days = [F]/[E] = ___			[F] = sum of D = ____

Notes:

[B] Go through the card covering the review period. Add the number of days that each of the key essential drugs are not available. A drug is considered in stock if it is or its equivalent is available in either generic or branded form. Indicate [B] the total number of days out of stock.

The review should a 6-12 months period. If this is not possible then indicate the number of days covered by the review.

APPENDIX G: STOCK OUT DURATION II

APPLICABLE TO HEALTH CENTRE IV AND DISTRICT HOSPITALS

(INDICATOR: STOCK OUT DURATION)

Survey Form No. 7

FACILITY _____ **DATE** _____

LOCATION _____ **RESEARCHER** _____

Key drugs in stock to treat common conditions[A]	No. of days out of stock[B]	No. of days covered by review[C]	Equiv. No. of days/year [D]=[B]x 365/[C]
1. Amoxicillin capsules 250mg			
2. Ciprofloxacin tablets 500mg			
3. Quinine sulfate tablets 300mg			
4. Cotrimoxazole tablets 480mg			
5. Ketoconazole tablets 200mg			
6. Mebendazole tablets 200mg			
7. Metronidazole tablets 200mg			
8. Lidocaine HCL injection 2%			
9. Quinine DI-HCL injection 600mg/2ml			
10. Ceftriaxone injection 1g			
11. Methylergometrine injection 200mcg/ml			
12. Gentamicin injection 40mg/ml			
13. Hydralazine injection 20mg/ml			
14. Magnesium sulphate injection 50%			
15. Cimetidine tablets 200mg			
16. Medroxyprogesterone injection 150mg/ml			
17. Clotrimazole cream 1%			
18. Paracetamol syrup 120mg/5ml			
19. Sodium Chloride infusion 0.9%			
20. Tetracycline eye ointment 1%			
[E]= Total No. of key drugs = (sum of A) = ___ [G]= Ave. no. of stock out days = [F]/[E] = ___			[F] = sum of D = ____

Notes:

[B] Go through the card covering the review period. Add the number of days that each of the key essential drugs is not available. A drug is considered in stock if it is or its equivalent is available in either generic or branded form. Indicate [B] the total number of days out of stock.

The review should a 6-12 months period. If it is not possible then indicate the number of days covered by the review.

APPENDIX H: ACCURACY OF STOCK RECORDS I

APPLICABLE TO HEALTH CENTRE II AND HEALTH CENTRE III

(INDICATOR: % OF RECORDS THAT CORRESPOND WITH PHYSICAL COUNTS)

Survey Form No 8

FACILITY _____ **DATE**_____

LOCATION _____ **RESEARCHER**_____

Key drugs in stock to treat common conditions[A]	Record Count	Unposted Receipts	Unposted Issues	Adjusted Total	Physical Count	Record coinciding with physical counts Yes = 1, No = 0
1. Amoxicillin capsules 250mg						
2.Acetysalicylic acid(aspirin)tablets 300mg						
3.Chloroquine tablets 150mg base						
4. Cotrimoxazole tablets 480mg						
5. Ferrous sulphate/folic acid tablets 200mg/400mcg						
6. Mebendazole tablets 200mg						
7. Metronidazole tablets 200mg						
8. Retinol(vitamin A) capsule 100,000 IU						
9. Sulphadoxine/pyrimethamine tablets 500/250mg						
10. Benzyl penicillin injection 1g(1MU)						
11. Methylergometrine injection 200mcg/ml						
12. Gentamicin injection 40mg/ml						
13. Hydralazine injection 20mg/ml						
14. Magnesium sulphate injection 50%						
15. Measles vaccine						
16. Medroxyprogesterone injection 150mg/ml						
17. Benzoic acid + salicylic acid ointment 6%+3%						
18. Paracetamol syrup 120mg/5ml						
19. Oral rehydration salts(ORS)						
20. Tetracycline eye ointment 1%						
[B]= Total No. of records reviewed = ___	[B]					[C]
[C]= Total No. of records that coincide with physical counts = ___						
[D]= % of records that coincide with physical counts = ____						

Notes:

1. [B] Select 15 stock records of any of the 20 key drugs listed.
2. Adjust for unposted receipts and unposted issues where applicable.
3. [D] % of records that coincide with physical counts = $\frac{\text{Total No. of Yes answers [C]}}{\text{Total number of records reviewed [B]}} \times 100$

APPENDIX I: ACCURACY OF STOCK RECORDS II

APPLICABLE TO HEALTH CENTRE IV AND DISTRICT HOSPITALS

(INDICATOR: % OF RECORDS THAT CORRESPOND WITH PHYSICAL COUNTS)

Survey Form No 9

FACILITY _____ **DATE**_____

LOCATION _____ **RESEARCHER**_____

Key drugs in stock to treat common conditions[A]	Record Count	Unposted Receipts	Unposted Issues	Adjusted Total	Physical Count	Record coinciding with physical counts Yes = 1, No = 0
1. Amoxicillin capsules 250mg						
2. Ciprofloxacin tablets 500mg						
3. Quinine sulfate tablets 300mg						
4. Cotrimoxazole tablets 480mg						
5. Ketoconazole tablets 200mg						
6. Mebendazole tablets 200mg						
7. Metronidazole tablets 200mg						
8. Lidocaine HCL injection 2%						
9. Quinine Dl-HCL injection 600mg/2ml						
10. Ceftriaxone injection 1g						
11. Methylergometrine injection 200mcg/ml						
12. Gentamicin injection 40mg/ml						
13. Hydralazine injection 20mg/ml						
14. Magnesium sulphate injection 50%						
15. Cimetidine tablets 200mg						
16. Medroxyprogesterone injection 150mg/ml						
17. Clotrimazole cream 1%						
18. Paracetamol syrup 120mg/5ml						
19. Sodium Chloride infusion 0.9%						
20. Tetracycline eye ointment 1%						
[B]= Total No. of records reviewed = ___	[B]					[C]
[C]= Total No. of records that coincide with physical counts = ___						
[D]= % of records that coincide with physical counts = ____						

Notes:

1. [B] Select 15 stock records of any of the 20 key drugs listed.
2. Adjust for unposted receipts and unposted issues where applicable.
3. [D] % of records that coincide with physical counts = $\frac{\text{Total No. of Yes answers [C]}}{\text{Total number of records reviewed [B]}} \times 100$

APPENDIX J: INFORMED CONSENT FORM

Dear Participant

The study for which your participation is requested aims to evaluate the drug management at Public Health Facilities in Uganda. Inadequate access to essential drugs in public health facilities still remains a problem despite the increased budgetary allocation to drug procurement by the Ministry of Health. The study is for research purposes but the findings will contribute to the generation of knowledge base for policy makers to make well informed decisions so as to improve the drug management in the public health sector for the benefit of the entire nation.

You will be requested to respond to questions during a face to face interview. Your answers to the questions and other information provided by you will only be used for the purpose of the research and your name will be used for authentication purposes only. You are assured that your identity and the information given will be treated with strict confidentiality.

Your participation in this study is voluntary. You have the right to refuse to participate or withdraw from the study at any point.

Declaration:

I have read and understand the above information. I consent voluntarily to take part in this study as a participant and know that I have the right to withdraw from the study at any time without any consequences.

....

(Name of participant) (Signature)

Date:

(DDMMYY)

....

(Name of Researcher) (Signature)

Date:

(DDMMYY)